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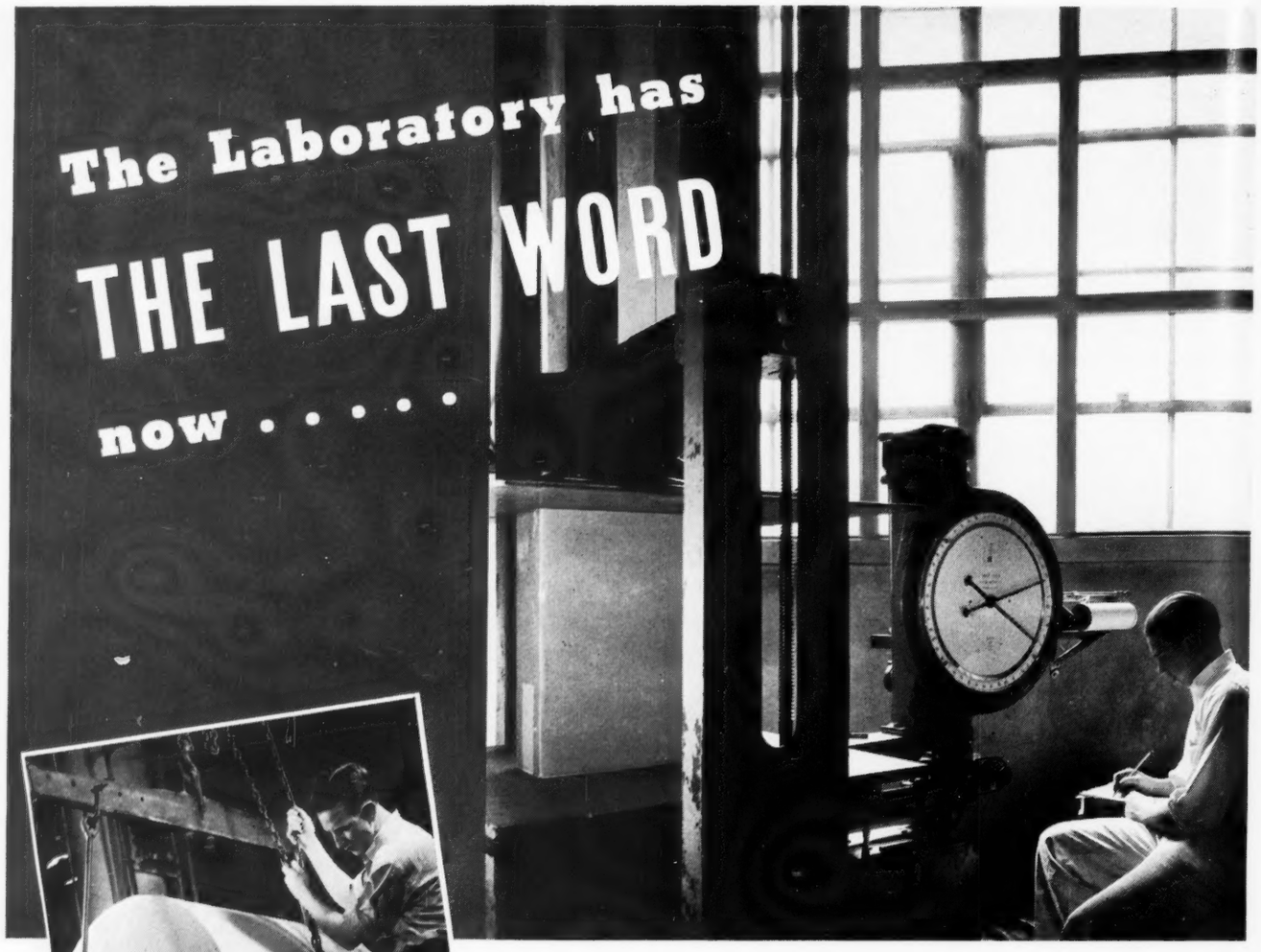

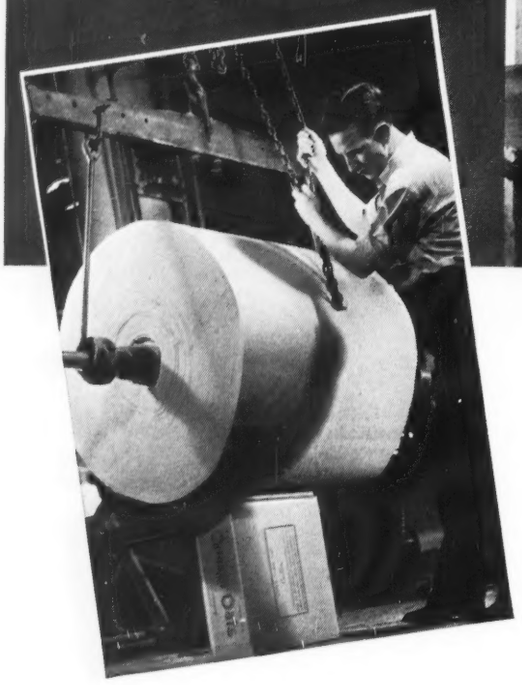

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Contents for October, 1936

Volume 8, Number 10

FOOD INDUSTRIES

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CONVEYOR
installation report:

G. E. Peterson, manager of the Twin City Wholesale Grocery Company, St. Paul, states:

"... through savings effected our large system of conveyors paid for themselves in one year."

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"PROFITS INSIDE THE PLANT"

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 8, No. 10

Laurence V. Burton, Editor

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OCTOBER 1936

THE TALK OF THE INDUSTRY

THERE is a deluge of handouts, releases, speeches, analyses and opinions about what the Robinson-Patman law really means and what it will do to industry. If it keeps up, we fear it will get us down. Our desk is filled with them. There are piles all over the top. We have enough reading matter to keep us busy until next summer. But we cannot get any one to tell us what he is doing to comply with the law. That would make really interesting reading.

The only really bright spot in the drab obnoxious affair is word from Washington that two members of the Federal Trade Commission are of the opinion the Act is unconstitutional. Maybe a *Literary Digest* poll here would be a great help.

SOMETHING STRANGE causes Ohio to be the focal point from which radiates the absurd theory that aluminum cooking utensils are the cause of many human ills. Hereto-

fore it has been claimed that cancer was caused in this way. And now Dr. R. Le Hunt Cooper of London presents a paper at the 92d Annual Convention of the American Institute of Homeopathy in Cleveland alleging that eczema, constipation and intestinal ulcers are caused in this way. Ho. Hum.

THOSE who realize that the news from abroad is really history unrolling before their eyes may reflect with benefit to themselves on this point. Between communism and fascism there is not much practical difference. Both involve a form of dictatorship. Neither of them can function without the rigorous control of a dictator. Yet no one has discovered how to make a dictatorship self-perpetuating. The dictator is the top dog in the heap. When he dies the real fun begins. The awful events in Spain are nothing compared to what could happen in a first-class industrial nation when a new would-be dictator is trying to land his first job.

WERE it not for its agricultural control feature we would feel obliged to deprive you of the following item from The Roxbury (N.Y.) *Times.*

"The reavy rain on Monday afternoon was of great help with the heavy rain we had last week. During the storm three cows were killed by lightning owned by George Height and the electric service in this village was out of commission for severas hours so no movies could be held and the Firefen's Carnival was unable to open on Monday evening."

WE HAVE often speculated on what we could do for existence in a communistic country. A genuine dyed-in-the-wool Bolshevik Russian reassured us the other day.

He told us that in Russia we would either be made head of a technical publishing trust or head of a big food trust. And we would not need to wear chin whiskers either. Not bad, not bad. In fact, not half-bad.

IT do beat all how folks can change their minds. A year ago Jacob Ruppert's sales manager most emphatically told us that the tin can for beer might be all right for the other fellow. But, for a brewer who sold

his beer in a single city like New York, the beer can was out. And now Ruppert has signed a contract for tin cans and is doing it in a big way.

ONE of the great difficulties of our job is to keep a straight face in time of stress. If we should die of apoplexy, put it down as a casualty resulting from strict adherence to duty.

Back in April we were subjected to an unusual test. The plant engineer of an outfit near Boston was explaining very earnestly how ozone keeps bananas cool. Refrigeration is used only when the ozone machine is shut off.

And a few months before that a very small sauerkraut manufacturer gravely informed us that sauerkraut is made in a hydraulic press. He even informed us that if we had not heard of this method we were out of date, lacking in alertness and other virtues.

The prize occasion, however, was the chap who had invested every cent he owned in a trick method of sterilizing fruit juice. He was the proud owner of a Rube Goldberg sort of contraption equipped with electrolytic "dee vices" which would make fruit juices keep forever. When asked about the purposes of the steam pipes in the machine he explained that the electrolytic "dee vice" worked better

at higher temperatures. Around 160–180 deg. F. the performance was superb.

Then he explained how the now sterile juice was filled into sterile bottles and capped. "With sterile caps?" we asked. No, he explained, that is unnecessary. Because of a little non-sterile air in the head space, which needed to be sterilized, he combined the business of sterilizing the air and caps into one operation. All he had to do was to put the filled bottles into a Fort Wayne pasteurizer filled with water at 180 deg. F.—an operation which, he confided, would sterilize the head space and cap in about forty minutes.

WE see by the papers that Uncle Dan Wallace has joined the staff of the farm division of the Republican National Committee. Back in 1933 he urged Henry not to take the job as Secretary of Agriculture on the grounds that the Administration would need a goat, that the goat might easily be his nephew. It looks now as if Uncle Dan might be out to make good on his prediction.

"Ain't We Got Fun?"

DO you remember these lines from an old song?

"The rich get richer
And the poor get children.
Ain't we got fun?"

Between that harmless absurdity of twenty years ago and today's conditions there is a sickening parallel. Nearly every bit of federal legislation designed to help the Simon Pure common man—from the National Industrial Recovery Act down to the recently enacted Revenue Act—has worked out in a manner decidedly different from the purposes of the reformers.

Instead of helping the weak and the poor, all of them have had the opposite effect. To say that, as a result of most of the recent, so-called reform legislation, the rich get richer and the poor get poorer in a business way, is no exaggeration.

Such an outcome is the inevitable result of half-baked legislation, conceived by immature minds, and enacted by a rubber stamp Congress that is devoid of statesmanship, wisdom or strength of character. It is to be hoped that the November elections will bring into Congress enough statesmen to bring order out of chaos.

Even the Robinson-Patman Law, designed to trim the pants off the corporate grocery chains, seems destined to make the rich get richer.

Ain't we got fun?

Hors d'Oeuvres

• *Do you know who put the hole in the doughnut? No, not a Scotchman. It was an old New England sea captain named Hanson Gregory. He noticed that his mother's doughnuts always were undercooked and doughy at the center. "Mother", he said, "leave a hole in the center." She did. Now people eat $50,000,000 worth of holes annually.*

• The Bureau of Animal Industry has stopped government inspection of dog food, thereby officially pooh-poohing the pooch.

• *It is said that the annual business in dog food amounts to $65,000,000. We love our puppies, even if the government doesn't.*

• In Palestine, locusts are commonly fried in sesame oil, while in Africa thick brown soup is made from them. The Arabians pull the legs and wings off, toast the locust in an iron pan and then dry it in the sun. In Syria, locusts, often as thick as your finger and two or three inches long, are mashed into paste with cold water and eaten with olives. We could tell you lots more about locusts, but we wouldn't want to spoil your appetite.

• *Bakers used to say that their cakes were as good as those made at home. Now they claim they are better. So the question arises: Has the baker improved or does mother play too much bridge? The answer: "Both."*

• In ancient Rome, men used milk to retard growth of the beard, while women used it as a beautifying bathing fluid. Nero's wife, Poppæia, bathed in the milk of 500 asses. Yet, Nero's passion was fiddling.

• *Prune beer is to be manufactured in California. The physiological reactions of prunes being what they are and the effect of green beer being likewise, consider the awful predicament of the man who drinks green prune beer.*

• In California it is against the law to advertise beer in letters more than six inches high. So instead of drinking beer the Californians are guzzling "beep," "——r" and "bees on draught." Who's crazy now?

• *French truffles are to be grown experimentally by the Department of Agriculture. This product, a gastronomical delicacy, is a* tuber melanosporum. *We don't know what that is, either, but we are told it is a mushroom-like growth about the size of a potato. Truffles made $7,000,000 for France last year, and $7,000,000 can't be wrong.*

Oxygen Preserves Milk?

AS if in answer to our recommendations that a process be developed to keep milk fresh for several months the U. S. Department of Commerce reports that it has been done in Germany. The method is said to be the discovery of a Dr. Hofius. He oxygenates the milk after the manner of carbonating water and thereby keeps it fresh for two months without refrigeration.

In this country the White Cap Company has developed a method described in July FOOD INDUSTRIES. It will keep milk fresh for a month under refrigeration.

The White method seems to depend on the absence of oxygen while the Hofius method apparently depends on the presence of oxygen.

In view of the conflict of the reasons presumed to underlie the method of keeping milk fresh, we'll stick to the American method which we know will work.

Strange Interpretation of Patman Law

AS lawyers, we must admit under pressure, we are excellent judges of sidewhiskers. We once supposed that a Federal Law was the document enacted by Congress—such as the one signed by the President, on June 19, 1936, for example. Ap-

parently such an idea does not hold with respect to the Robinson-Patman Act. And perhaps we are wrong about many other laws also.

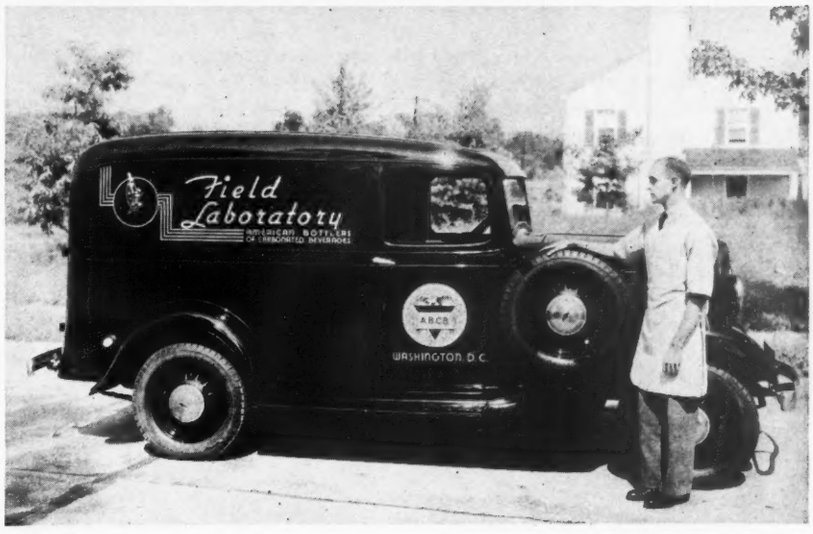
Our confusion arises from a reading of a document put out by the Federal Trade Commission on Aug. 22, 1936, entitled: "Data compiled from public sources of information and reproduced by the Commission in connection with its administration of the Robinson-Patman Act of June 19, 1936, Public 692, amending Section 2 of the Clayton Act (U.S.C. title 15, Sec. 13)."

This document *may* be very important in the future. Our interpretation is that the Act is so ambiguous that the enforcing body, the F.T.C., has resorted to the testimony of committee hearings, conference reports, committee reports and the Congressional Record to find out what the law was meant to mean. If this be the attitude of the F.T.C. then it behooves all interested parties to read this document, for there is much more in it than is stated in the law itself.

The Missing Clauses

WHEN a business man searches through the Robinson-Patman law for light by which to guide his course of business, the one thing he is looking for is not there. He is looking for some statement of how to hold the business while complying with the law, but he can't find it. The Robinson-Patman law merely says you must not do thus-and-so, but it is entirely up to you to figure out how to keep your customers, or even keep your business going.

In this respect this law resembles many other New Deal laws of recent memory. Many persons feel that the National Industrial Recovery Act would have been workable, might never have been called into question before the Supreme Court, had it contained information on how to make the public pay the prices that were required under NRA, and make them keep on paying. Of course, it would have been a miracle had Congress been able to write such information into the law. Business has been trying for centuries to find out the answer to just that sort of problem. Furthermore the same problem is at the bottom of most labor disputes. Manufacturers would not be reluctant to grant wholesale wage increases if it were easy to pass the wage-increase along to the public. Which it is not. And it never will be.



John M. Sharf, Technical Service Director of American Bottlers of Carbonated Beverages, standing beside the new "Field Laboratory" of the association. He will take the laboratory to more than 300 carbonated beverage plants on a 3,000-mile trip. The National Canners Association has had a mobile laboratory for several years. More recently the Bureau of Dairy Industry, U. S. Department of Agriculture, acquired one. The ABCD field laboratory is probably the third of its kind.

And then there is dear old AAA of lamented memory. As Mr. L. B. Winton once remarked: "The agricultural problem of the United States is simple—absurdly simple. All you have to do is get the people to pay a little bit more for farm products." You can search through the old law for a month and you cannot find one word about how to make the public pay the increased price. It just isn't there.

And now business is confronted with compliance with the Robinson-Patman law. As a matter of fact, compliance is very easy if you don't care what happens to your business. Until this law is declared unconstitutional by the Supreme Court, we suggest that the United States Wholesale Grocers Association—the outfit that is responsible for this measure—give thought to an amendment. This amendment should show how a fair minded manufacturer can keep up his volume of business without recourse to salesmanship or compromise. And besides that, there ought to be a law to compel the customers to pay up and shut up. Business is getting too difficult.

Food Manufacture vs. Rust Cotton Picker

"BEWARE of Six-Cent Cotton" was the warning given five years ago to the food industries in these pages (p. 467, Nov. 1931). When the price of cotton rose to much higher figures the threat to the Southern market diminished. But now that the Rust Cotton Picker has been invented —inefficient though it may be today— the Southern markets for manufactured foods are again threatened.

In 1931 the threat was temporary. This time it will be permanent. Just as soon as the Rust brothers take the "bugs" out of their machine and put it to work, the troubles for food manufacturers will begin. A huge number of share-crop cotton farmers will be permanently displaced. Economic necessity will compel them to raise their own food instead of purchasing it. In spite of the efforts of the brothers Rust to cushion the blow it will come about.

Salvage Your Equipment Reserves

IN the past the tax collectors have not been greatly interested in the labels put on to corporate reserves. This is not true under the Revenue Act of 1936. If a concern sets up an equipment reserve—a fund for depreciation and obsolescence—the reserve will have to be used or it will be taxed.

Corporation executives should study this angle carefully and salvage their equipment reserves by buying new equipment before the taxable year is over.

Careful planning at this time may save enough in taxes to pay the cost of some much needed new equipment.

MOVING THINGS from place to place around the plant is one of the chief activities of any kind of manufacturing. And this includes food manufacturing. Mind you, it's an activity, but the manufacturer doesn't get paid for it; not unless he is in the transportation business. So it is up to him to do it as cheaply as possible. Or else the cost of materials handling will rob the really profitable operations of most of their gains.

Materials handling does not do anything to a product—at least it should not make any changes in it if the job is done right. The product or material is just the same as it was before it was moved. But it is in a new location, ready for something else to be done to it.

BETTER MATERIALS HANDLING *Is Important to You*

Raw material comes into the plant. It must be unloaded. Then it must be moved to raw material storage. It is still raw material, but it has picked up some costs. Then it moves to the first operation of manufacturing. Here it is changed in form or composition, which is really a profit making change. Next the partially manufactured material moves on to another operation and something more is done. Other moves and other operations follow, step by step, until finally the product is complete. It is now a manufactured item or commodity. But materials handling keeps on. The job is not yet done.

The product must be moved into a package or container. Maybe these must go into larger shipping containers. And then they must go to the stockroom, warehouse, storage space or shipping platform. All these moves are still materials handling. And there is still more to be done. The food manufacturer may turn the rest of the work over to a transportation company. Or he may do the job of distributing the goods himself. But still it is materials handling.

Moving materials requires several things: power, effort, equipment to do the job, and time in which to do it. Time is very important. For the time spent in moving the stuff from one operation to another is one of the most wasteful of losses. It varies tremendously between industries. In some plants as much as 90 per cent of the total manufacturing time is taken up by the mere movement of material.

Study your own plant. See how long an operation or process actually requires. And then see how long it takes to fill or empty equipment and take products away.

Materials handling takes time. And time is money, especially if the help is standing around waiting for the movement to end so that they can go to work. But the cost of materials handling does not end there. A definite amount of labor is often required to carry out the movement of materials. A lot of expense can creep into the total cost figure just for boosting the goods around.

IN days gone by, all this moving of stuff from one operation to another was done by hand. You hired men to carry everything from place to place, and from operation to operation. Even today some plants have to do a lot of hand work. In one very up-to-date, fully mechanized plant there is one materials handling operation that has to be done by hand. One man handles an average of 575,000 lb. of material a day. That's a lot of stuff for one man to handle, but everything is made easy.

In most plants today, however, machinery does the work of materials handling. Some type of device, gadget or machine does this dull routine of moving things from place to place, and men are free from the endless, tiresome drudgery so that they can spend their time on the more important jobs. Jobs where a little gray matter is of more value than a strong back and a weak mind.

Lots of other advantages are gained by mechanical materials handling. To be sure, time and labor are saved. But that is not all. The flow of materials can be made more steady and uniform by mechanization. There never need be a succession of feasts or famines.

And on top of that, the speed of delivery of automatic materials handling equipment can be exactly timed to synchronize with the next step in manufacture. Or if the next step is a hand job, the automatic equipment sets a pace that the workers must follow.

THERE are two classes of materials to be handled in a food plant. Some things will flow and other things will not flow. When a material will flow it can be pumped. And hence the unit operation of handling flowing materials is usually called pumping.

When the material will not flow, it requires very different methods of handling. All these methods are lumped together under one descriptive term—materials handling. The cost of materials handling can always be reduced. There is always a cheaper way, or a better way, or a smoother way. No one can apply the latest developments of materials handling to your plant as well as you can do it yourself if you know what can be done. For this reason, the following pages are a mine of valuable information. They show you the most advanced practices in materials handling for materials that are not fluids.

The Oftenest Used Unit Operation

MATERIALS HANDLING

A UNIT OPERATION OF FOOD ENGINEERING

Materials Handling

► Every branch of the food industries uses this unit operation of food engineering to reduce manufacturing costs and coordinate processes. Materials handling is not only the most commonly used unit operation, it is the one indispensable operation. It covers all phases of the handling of materials which cannot be handled in pumps.

This is No. 7 of a series on the unit operations of food engineering.

ANY PLANT—every plant—be it large or small, must handle its materials. No matter how the job is done, the materials in the course of manufacture must be moved in and out and through the plant. Otherwise no goods could be produced in any food plant of today.

Whether it be loading, unloading, moving, hoisting, lowering, conveying, trucking, sliding, pushing, dragging, or just plain "toting," it's materials handling and it has to be done. The materials must be carried to the equipment, for the equipment cannot be taken to the materials.

Yet materials handling does not, itself, produce any goods. It comes pretty close to an operation that is all cost and no profits. Nevertheless it is an indispensable operation.

To do the best possible job of materials handling or to reduce the cost of this unit operation requires a thorough understanding of how each kind of equipment works. As used in the food industries, materials handling equipment is of two general groups:

1. Equipment that is fixed in position and carries the material from one place to another.
2. Equipment that is movable and moves from place to place with the material.

The first group is generally known as conveyors and includes the following equipment:

Belt conveyors (see Fig. 1) in their simplest form consist of endless belts carried on a driving pulley at one end of their run and an idler pulley at the other end. These belts are supported at intervals, at both top and bottom parts of the run, by rollers called idlers. Material is carried on the upper surface of the belt, in either or both parts of the run, but usually is carried only on the upper part of the run. These conveyors are driven from an electric motor through gearing, or speed reducers, or by means of a power-transmission belt.

Gravity roller conveyors (see Fig. 2) consist of a series of rollers mounted on ball or roller bearing spindles and held between the parallel sides of a structural steel frame. The frame is supported so as to be slightly inclined in a direction at right angles to the roller shafts. Objects that are sufficiently smooth on the under side, such as cases or cartons, will slide along such a conveyor, downhill, propelled by the force of gravity alone. Where it is necessary to move the objects over a level portion of the conveyor, or uphill, a section of the rollers can be driven from a motor by means of gearing, or a belt conveyor of suitable length can be inserted in the roller conveyor line.

Chain conveyors are of two general classes:

(a) Where the load rests on the conveyor.
(b) Where the load hangs from the conveyor.

In this first class will be found many different types. The simple type, which is commonly called a *chain* conveyor, (see Fig. 3) consists of one or several endless chains, arranged so that the upper part of the run rolls or is otherwise supported on a steel structure. Each chain passes over sprockets, so placed as to keep the working surface of the chain under tension sufficient to support the load, which is placed directly on top of the chain. One sprocket, usually placed at a point beyond the unloading point of the conveyor, is driven by a belt, or a motor and gearing. The chains are often equipped with attachments to engage the objects that are being handled, or to prevent the chain from slipping under them.

Another type of chain conveyor has many variations available. It consists of two chains carrying between them some form of load-bearing attachment. These chains are of roller type, and roll on supporting structures at each side of the conveyor. Sprockets are placed in pairs, one for each chain in suitable locations to effect change of direction of chain travel, with one set of sprockets driven by belt, or by motor through gearing. As in simple chain conveyors, this set of sprockets is usually placed beyond the unloading point of the conveyor. The names applied to this type of conveyor usually refer to the type of load bearing attachment that is used. For instance, a *slat conveyor* had flat or shaped slats attached between the chains (see Fig. 4). An *apron conveyor* has steel aprons fastened to the chains (see Fig. 5). A *pusher-bar,* or *booster* conveyor has rods fixed between the chains, arranged to push objects along a smooth steel plate (see Fig. 6). And a pivoted *bucket carrier* has pivoted buckets held between the chains, with the buckets swinging loosely, so that a tripper can turn them over and dump them (see Fig. 7).

The second class of chain convey-

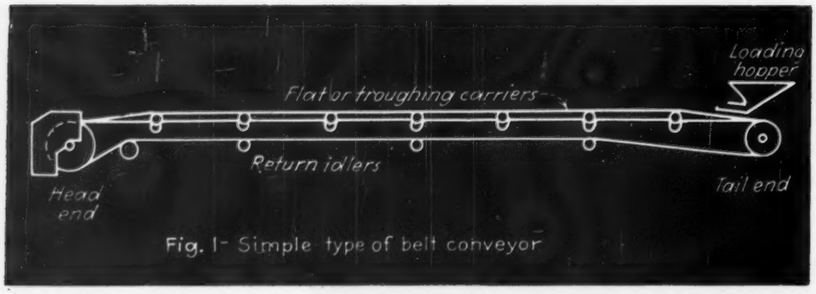


Fig. 1- Simple type of belt conveyor

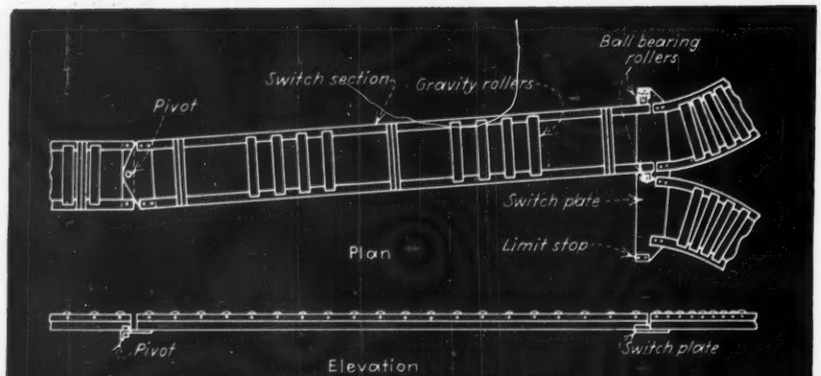


Fig. 2 - Gravity roller conveyor, showing switch section, indicating flexibility of such equipment

ors, together with monorail conveyors, are known as *overhead conveyors.*

Overhead chain conveyors, or *chain trolley conveyors,* (see Fig. 8) consist of a single run of endless chain, with attachments at regular intervals along the full length of the chain. These attachments are equipped with rollers or trolleys, which run in the flange of a suspended guide rail or I-beam. On the lower side of the attachments are hooks or rings, from which loads can be suspended. One driving sprocket and an idling sprocket at each change in direction are used with these conveyors. Their advantage lies in the fact that a single endless chain of this type can be used to raise or lower objects as well as to carry them around horizontal curves.

Monorails, also called trolleys or tramrails, are the other type of overhead conveyor (see Fig. 9). They consist of a suspended rail or I-beam, on the flange of which run individual wheeled carriers. Sometimes these carriers are equipped with a motor, moving along the rail by electric power. Other monorails are pushed or pulled by hand.

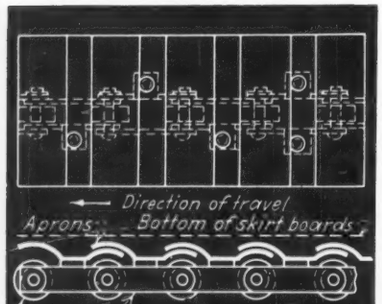


Fig. 5 - Apron conveyor of the single chain type. Two chains are used in larger types. Pans or platforms may be used instead of aprons.

Elevators are of several types. Belt and chain elevators are special forms of belt and chain conveyors, adapted for raising and lowering loads. They consist of an inclined or vertical conveyor, to which are attached various devices suited to moving objects upward or downward. The commonest form of elevator is the *bucket elevator* (see Fig. 10). This is made up of a series of buckets, attached to one or two endless chains, or to a belt. Another form of elevator is the *platform elevator,* which is in general like an ordinary passenger or freight elevator in a building.

The second great group of material handling devices is made up of those upon which the load is carried from place to place. This group is mostly composed of trucks and has two main divisions: Equipment moved by hand, and equipment having a motor.

Hand trucks can be divided into two general classes: Platform or load-bearing trucks; and lift trucks.

Platform trucks, (see Fig. 11) in their simplest form consist of platforms mounted on axles and having two, three or four wheels. In order to adapt these trucks to special handling needs the simple platform may be replaced by various special constructions. For example, in bakery and meat plant handling, instead of a platform, a rack suitable for holding several layers, or tiers of small objects, as loaves of bread, is used. In smoke houses, a framework to which the hams or other pieces of meat are hooked, is used. In macaroni plants, a framework is employed upon the top of which the rods bearing the macaroni are hung. The various types of bodies which can be substituted for the platform in this way, can be constructed to suit any purpose.

Lift trucks, (see Fig. 12) are simple wheeled frames equipped with a handle for pulling or pushing. Part of the frame is arranged so that it can be raised and lowered by means of a built-in jack, or ratchet device. In use, the lowered truck is pushed under a *skid platform,* consisting of load bearing platform raised off the floor on legs or on wheels. Then the jack is operated. This raises the movable part of the truck frame, and the load bearing platform is raised off the floor just enough so that it can be moved to the desired point while resting on the truck. When the load is in the desired position, the jack is operated to lower the skid platform to the floor. The truck can then be removed and used for other work.

Skid platforms (see Fig. 13) can be constructed to meet the same wide variety of handling problems that are met by platform trucks.

The handling system involving the use of lift trucks and skid platforms has been developed because, for certain materials handling operations, it is more economical than the use of platform trucks. With it, one operator and one wheeled device can be kept steadily busy handling a number of the less costly skid platforms. Loads can be stored on the skid platforms, ready to be moved out of storage when desired, without any rehandling. As the skid platforms are inexpensive, this method does not result in tying up any expensive equipment.

Trucks that are equipped with a motor are generally known as *industrial trucks.* Perhaps the commonest form is the electric industrial truck, which runs by electric motor, receiving its current from storage batteries carried in the truck. The other common form of industrial truck which is driven by a gasoline motor, is widely used where electricity for charging storage batteries is not available, or is too expensive.

Industrial trucks of many type are made. One of the commonest is the lift model. This is used with skid platforms, in a way entirely similar to the use of hand lift trucks and skid platforms. These lift trucks can also be used to carry loads placed directly on their platforms.

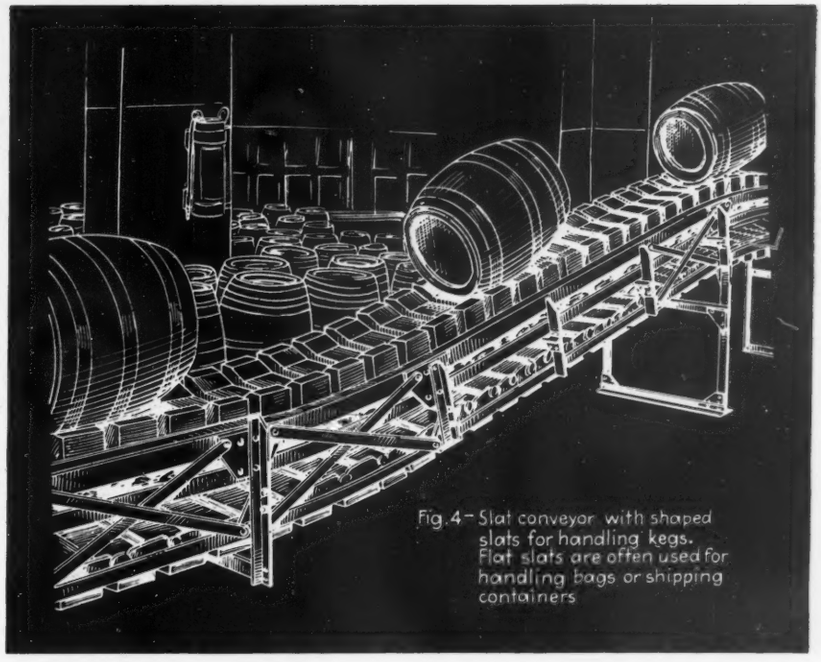


Fig. 4 – Slat conveyor with shaped slats for handling kegs. Flat slats are often used for handling bags or shipping containers

Low lift trucks (see Fig. 14) are exactly similar in function to hand lift trucks. The lifting arrangement of these trucks is designed to raise a loaded skid just high enough from the floor so that it can be moved from place to place.

High lift trucks, (see Fig. 15), or *tiering trucks,* are designed to raise a load well off the floor, in cases up to 14 ft., so that loads can be piled one on another in storage. With this truck it is also possible to feed material directly into machines at some height above the floor.

Fork trucks (see Fig. 16) are a special form of industrial lift trucks in which the platform is replaced by a fork, consisting of two or three tines. This fork can be tilted as well as raised and lowered, making it useful in handling heavy rolls of material such as wrapping paper.

With these fork trucks, a system of materials handling known as the pallet system has been developed. These pallets are light constructions of wooden slats (see Fig. 17). The blades of the fork can be inserted between the upper and lower rows of slats, and the pallet, bearing its load, can then be raised and moved from place to place. As the pallets are light, and flat, they are well adapted to piling one above another in warehouses and store rooms. In handling fresh produce, this pallet system has proved to be flexible and efficient, while in other lines its convenience is being demonstrated.

The combination of a motorized truck with several platform trucks, known as a tractor and trailers, (see Fig. 18), is useful in warehouse handling and at other times when relatively large quantities must be moved at one time, all from one place to another place. For instance, this system is useful in moving a large order out

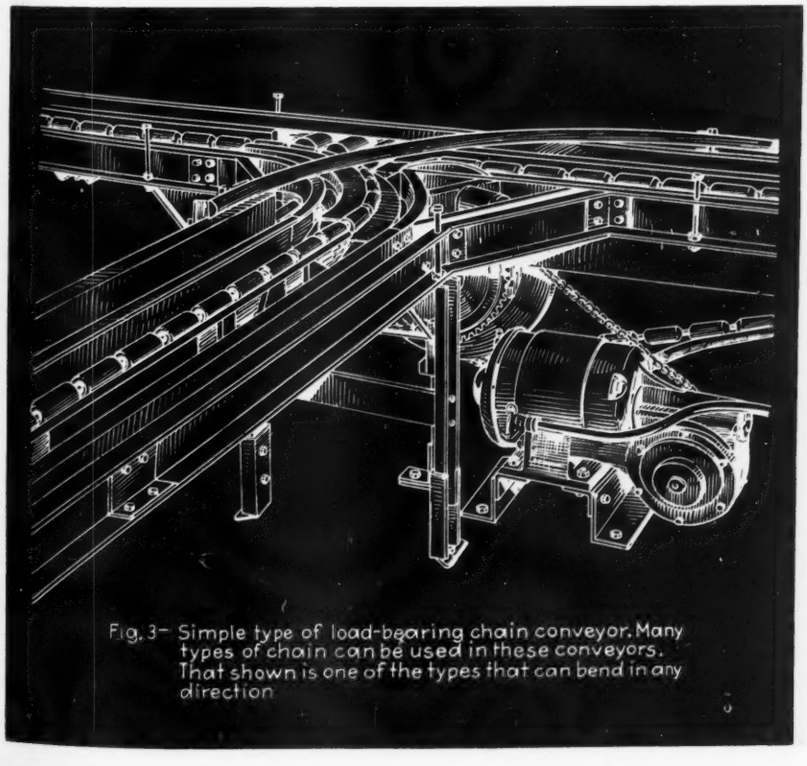


Fig. 3 – Simple type of load-bearing chain conveyor. Many types of chain can be used in these conveyors. That shown is one of the types that can bend in any direction

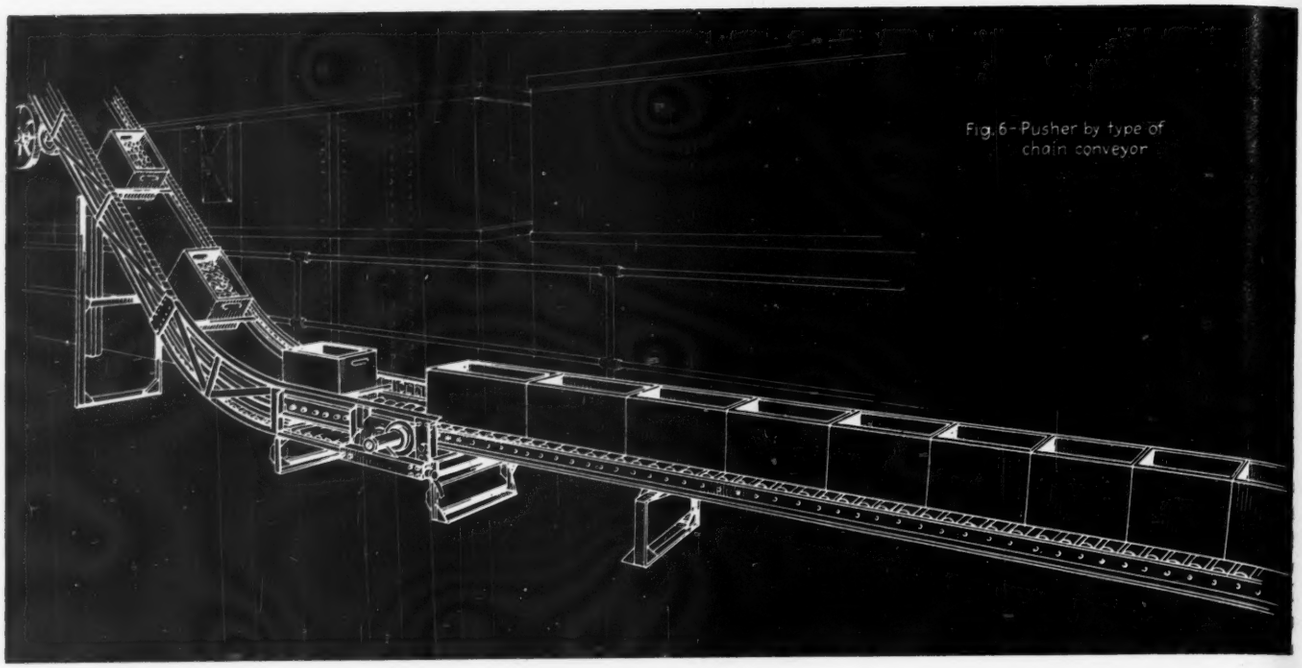


Fig. 6- Pusher by type of chain conveyor

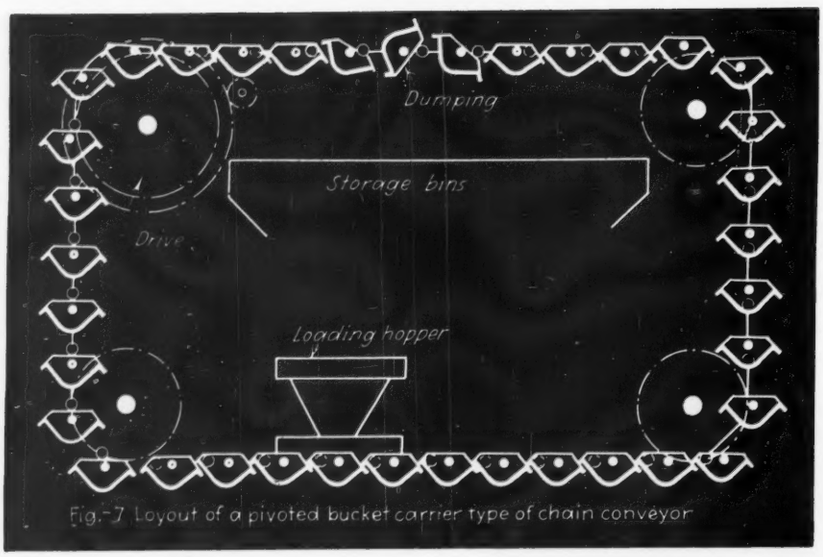


Fig. 7 Layout of a pivoted bucket carrier type of chain conveyor

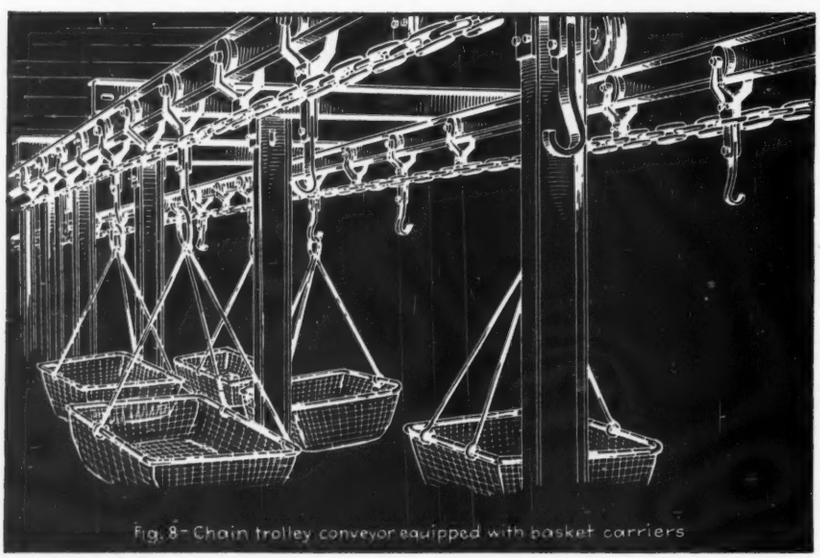


Fig. 8- Chain trolley conveyor equipped with basket carriers

of a warehouse to a freight car, or in moving bags of raw sugar from ship-side to refinery or warehouse.

Special Handling Systems For Solid Materials

When solid materials are sufficiently finely divided, there are several ways by which they can be moved as if they were true fluids, that is, by which they can be made to flow from place to place.

If the movement is all from a higher point to a lower point, gravity flow through a system of *chutes* and *hoppers* provides a highly flexible and efficient method that operates without any power cost. A chute is really a pipe or trough, placed with a slope steep enough so that the material slides down through it by gravity. Hoppers used with chutes serve as collecting points or reservoirs for material. Hoppers are equipped with gates or valves, so that material may be retained in them, or allowed to flow out.

When a finely divided dry, or semi-dry material is to be moved along a level, or up or down a slight incline, *screw conveyors* are useful. These are open or covered troughs, with a revolvable shaft extending through the entire trough length, and rotated by some means placed outside the trough. Attached to the shaft is the continuous helical, or screw thread shaped blade. As the shaft rotates, this blade pushes the material forward.

The combination of chutes, hop-

pers and screw conveyors with some form of elevator characterizes the handling methods employed throughout the grain milling industry. Its importance to the food field is so great that a more detailed discussion of the method is given elsewhere in this number of FOOD INDUSTRIES.

Materials that will float, and that are not harmed by immersion in water, are often conveyed in a moving stream of water flowing in a canal, sluiceway or pipe line. This type of handling is really a form of pumping, as the water stream is moved by pumps, and the solid material merely floats along with the moving water. The method is economical of water, which can be used over and over again. It is not particularly economical from the standpoint of power consumption because of the relatively great weight of water which must be moved for every unit of material that is conveyed. However, where handling in this way also accomplishes part or all of a necessary washing operation, the method is fully justified. Also, in certain cases this method, which is very gentle with the product, is useful in helping to avoid damage. Its particular application is found in handling fruits and vegetables such as citrus fruits, tomatoes and peas.

Another group of conveyors in which solid material is caused to flow includes the drag chain conveyors, and the Redler conveyor and elevator.

Drag chain conveyors, or ***flight conveyors*** consist of an endless chain, or chain belt, made up of "flights" or links of suitable design and carried at each end on sprockets, one of which is driven in some manner. This chain is arranged to drag through a trough. Material is fed into the trough from above, and discharges off the end of the trough, or through a hole in the trough bottom. As the chain moves along the trough, the material is propelled along the trough in a more or less solid stream. The chief resistance to movement in these conveyors consists of friction between the walls of the trough and the material moved. When the trough is correctly designed, and the chain is held at the correct tension, friction of the chain

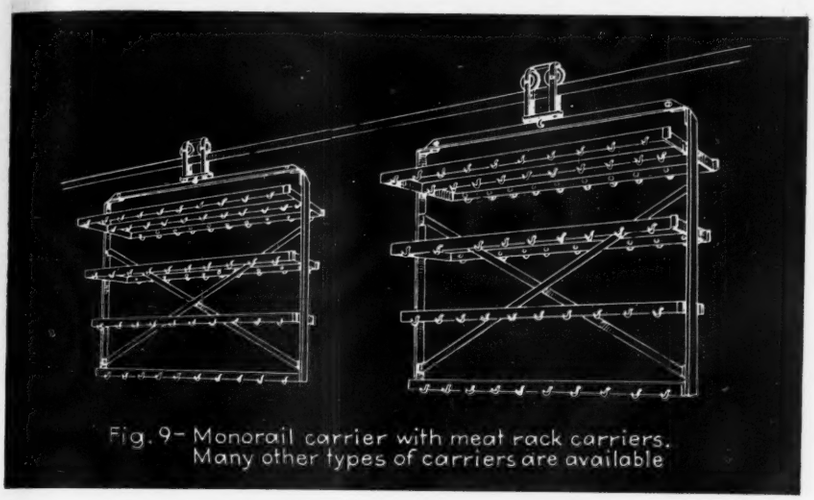


Fig. 9- Monorail carrier with meat rack carriers. Many other types of carriers are available

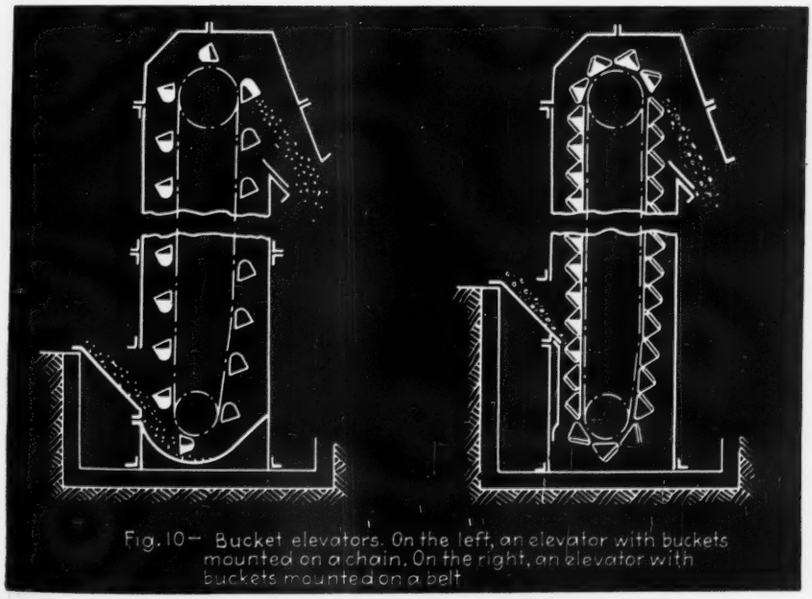


Fig. 10- Bucket elevators. On the left, an elevator with buckets mounted on a chain. On the right, an elevator with buckets mounted on a belt

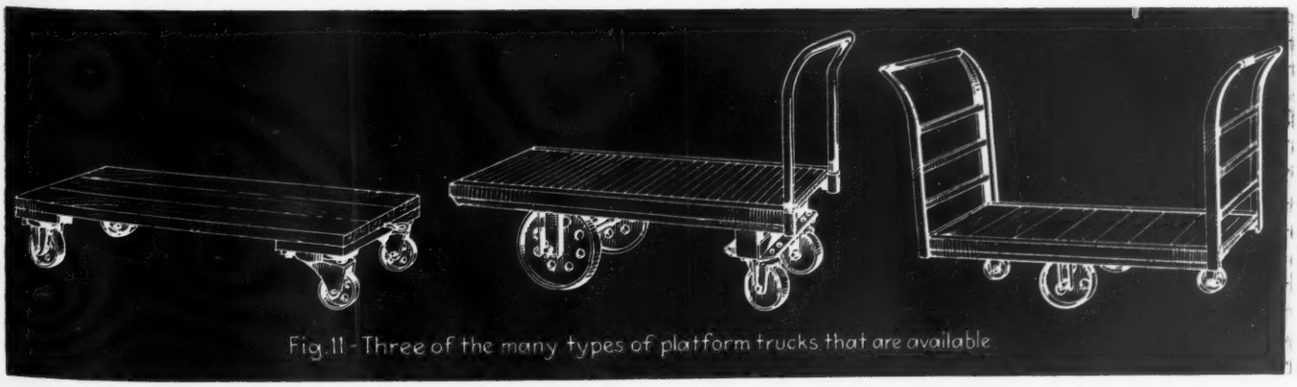


Fig. 11 - Three of the many types of platform trucks that are available

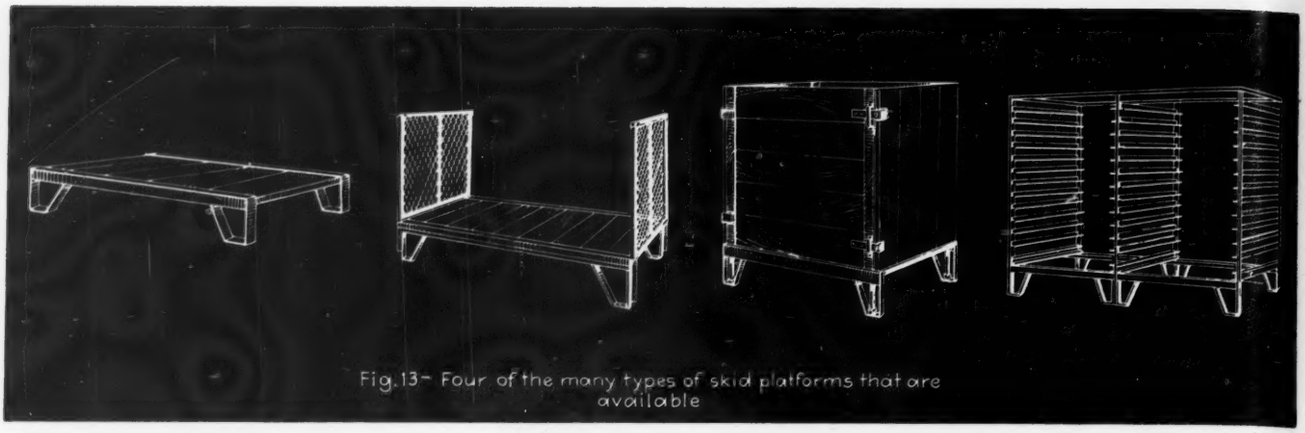


Fig. 13- Four of the many types of skid platforms that are available

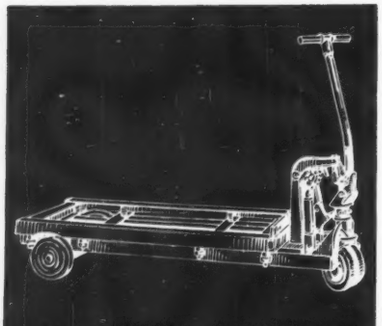


Fig. 12- Hand lift truck equipped with rubber tires and springs

along the trough is at a minimum.

A recent development of this general principle of materials handling is the *Redler conveyor* (see Fig. 19). This conveyor has been developed for handling powdered and granular materials by the flow principle. Among the food materials that have been successfully handled by this method are barley, beans, cocoa powder, cocoa beans, coffee, corn, breakfast foods, malt, wheat, wheat flour, starch, soy beans, rice, peas, peanuts and salt.

In designing this conveyor, the purpose was to cause the material, completely filling the casing and immersing the chain links, to move along the casing as a solid column. This avoids pressure on the material or undue disturbance of the material while in transit.

Reference to Fig. 19 will show the design of the flights. Note the U-shape of the vertical rising arms. These arms act as a reinforcement along the sides of the column of material that is being moved. They cause the bottom and sides of the column of material to move along with the link motion and the rest of the column moves along with them, with the minimum of disturbance. Other types of flights are available for special service.

The detachable flights or links are so designed that the chain will move around horizontal bends, as well as up vertical inclines. The method also permits material to be moved vertically upward. Consequently this conveyor can be used to move materials horizontally, vertically, up inclines, or around curves. Thus, a single conveyor can, in many instances, perform many operations.

Advantages claimed for this new *Redler* conveyor include avoidance of contamination, elimination of dust and explosion hazards, and no breakage of product handled.

There is one more form of conveying equipment in which solid material is caused to flow. That is the pneumatic conveyor, in which dry, solid, finely divided materials are moved by air pressure along a pipe line. Fig. 20 shows one arrangement of such a conveyor.

A stream of air is used to impart motion to the material, which may be sucked along a pipe, or blown along, depending upon where the blower or air compressor is located in the system.

With pneumatic conveyors, a device is necessary for separating the material and the air stream at the point of discharge. This is usually a centrifugal separator of the baffle type, in which the material falls to the bottom through an air lock. The air stream is discharged, in a suction system, from the separator to the blower or compressor. In a pressure system, the air is discharged to the atmosphere.

In Fig. 20 is shown the Fuller Company "Airveyor" pneumatic conveying installation at a Baltimore brewery. This system handles malt, which is unloaded by suction from box cars and carried to the separator marked two-stage receiver on the drawing. Malt is then discharged through the rotary feeder or air lock

MATERIALS HANDLING

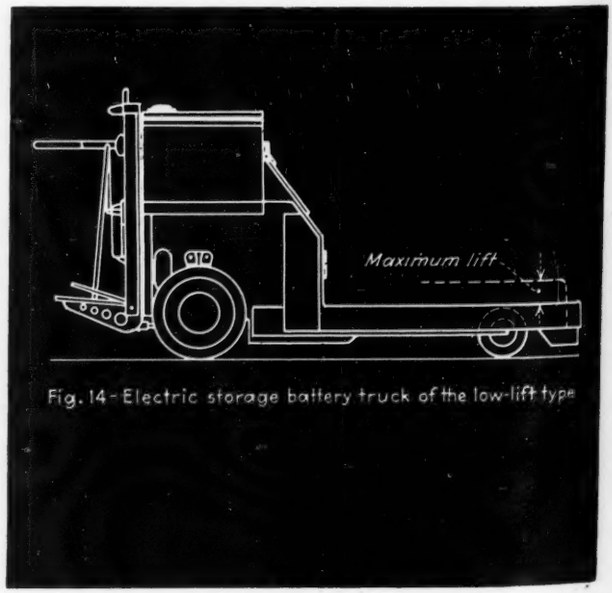


Fig. 14- Electric storage battery truck of the low-lift type

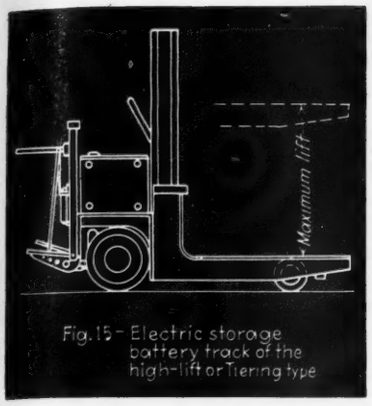


Fig. 15 - Electric storage battery truck of the high-lift or tiering type

beneath this receiver into a Richardson four-bushel automatic scale. From here it falls into a feeder delivering into a pressure line from the exhauster or blower which also serves to create the unloading suction for the cars. In this line, the malt is conveyed either to a single-stage receiver, or separator, above the four malt storage bins, or is sent directly to the scale hopper in the brewhouse.

Malt stored in the bins is reclaimed by suction and again drawn through the two-stage receiver, passing through the scales and then to the brewhouse. This arrangement makes it possible to deliver directly from car to brewhouse, when that is necessary. This system can handle 10 tons of malt per hour. It requires the services of but one operator.

Pneumatic conveyors in general have proved to be suitable for handling dry, finely divided materials, such as grains, soybeans and cereal products. When properly designed and installed, they have the advantage of avoiding dust hazards.

Handling Costs

Reliable data on conveyor costs, based on actual operating experience, have never been published, except in a few cases. Such data would, however, be of little real value, except as they might give a rough measure of what has been achieved. This is because, even for exactly similar installations of materials handling equipment, all conditions except those dependent upon first cost of the equipment will vary. In the first place, the cost of the installation will depend upon the plant and upon local labor conditions, among other factors. Therefore, interest on the investment will vary. Other variables are distances moved, quantities moved, use-factor of equipment, cost of power, cost of labor, cost of maintenance and repairs. For general purposes of accounting, depreciation may be figured at 15 per cent and upkeep at 5 per cent of installation costs.

To set up a system of accounting for materials handling costs, it is first necessary to determine the overhead chargeable to the operation. This overhead consists of the charges for interest, depreciation, floor-space rental, taxes, and managerial and administrative expense. These are time charges, and are equal to a certain amount per year, or per month, or per day, or per hour, or whatever time peiod is to be considered in the accounting system.

It is next necessary to determine the cost of actually operating the machine and the work done by the machine. The latter figure is obtained by recording the number of units

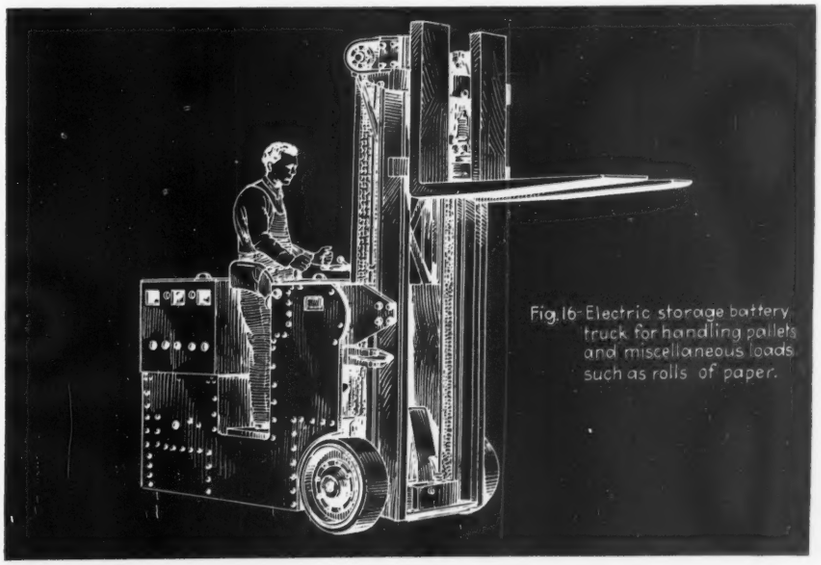


Fig. 16 - Electric storage battery truck for handling pallets and miscellaneous loads such as rolls of paper.

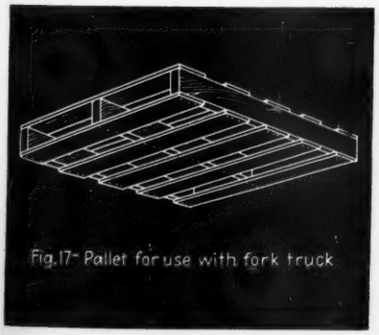


Fig. 17 - Pallet for use with fork truck

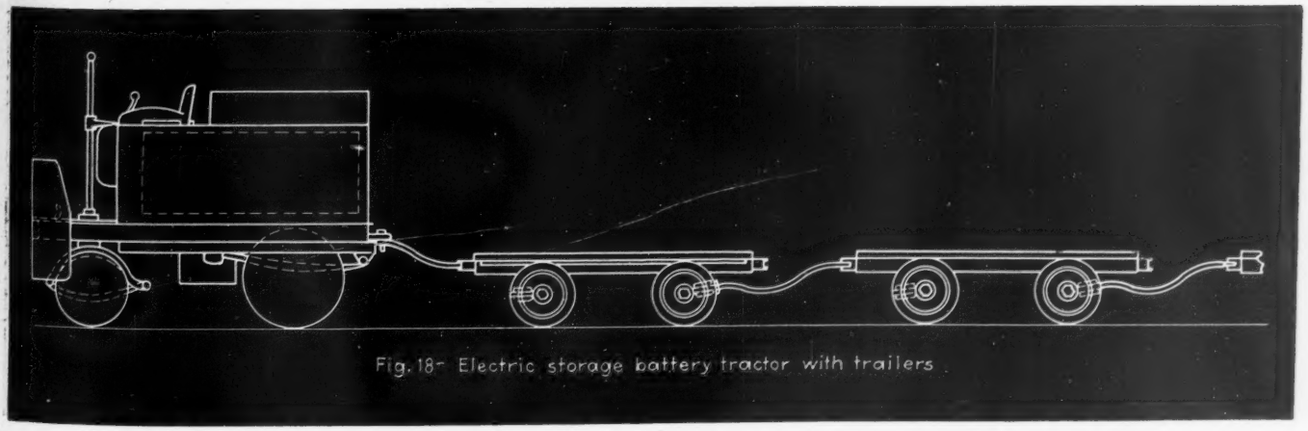
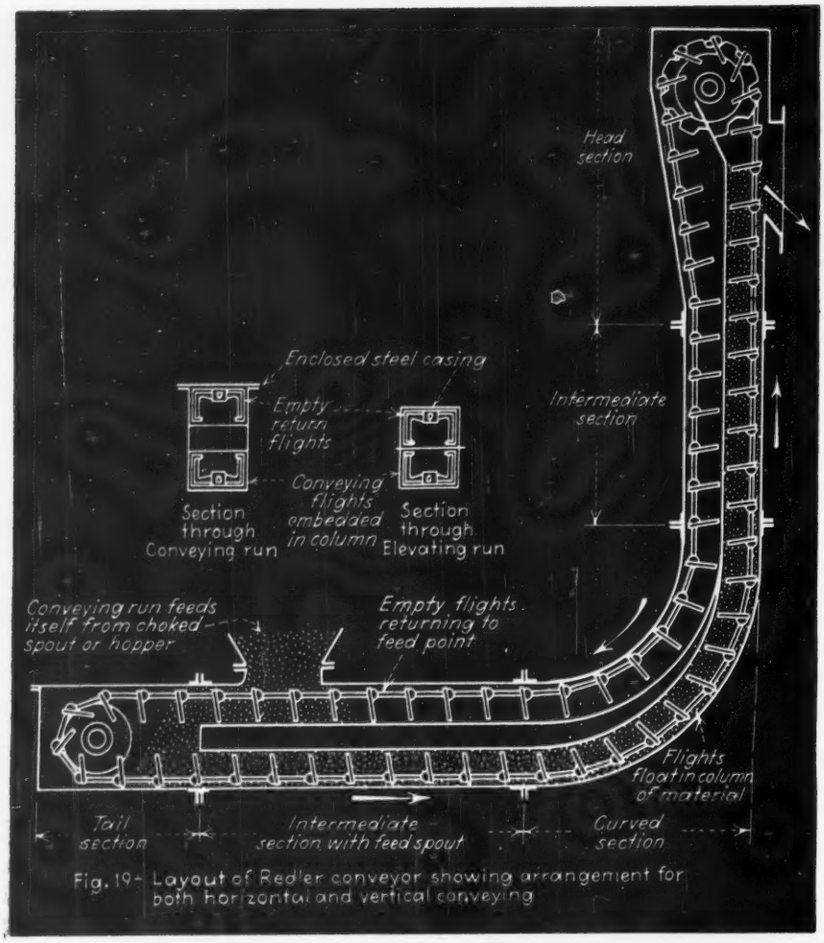


Fig. 18 - Electric storage battery tractor with trailers


Head section
Enclosed steel casing
Empty return flights
Conveying flights embedded in column
Intermediate section
Section through Conveying run
Section through Elevating run
Conveying run feeds itself from choked spout or hopper
Empty flights returning to feed point
Flights float in column of material
Tail section
Intermediate section with feed spout
Curved section
Fig. 19 - Layout of Redler conveyor showing arrangement for both horizontal and vertical conveying

ticular plant it is evident what it costs to carry out each handling operation.

Costs of handling by trucks and tractors have been rather fully studied, and fairly reliable figures, for specific jobs, have been published. Unfortunately this data is not for food plants, and as every change in the requirements of the handling job, such as distances moved and weight per cubic foot of material handled, changes the final cost, the food plant accountant must determine these costs for his own case.

To compare the cost of handling by a proposed installation of materials handling equipment, with the cost of handling obtained by the existing method, it is recommended that the food engineer employ the method developed by the American Society of Mechanical Engineers. This method is too long to reproduce here, but it can be obtained from the Materials Handling Division of the Society, located at 29 West 39th Street, New York, N. Y. A complete explanation of the method will also be found on pages 194 to 201 of "Modern Materials Handling" by S. J. Koshkin, published by John Wiley & Sons, Inc., New York.

handled in a unit of time, as tons per hour, or packages per minute, etc. This is obtained by dividing the total handled in an accounting period, say, one month, by the number of time units in the month during which the machine actually operated.

The cost of actually operating is made up of the cost of power used by the conveyors, the cost of labor required to operate the conveyors, and the cost of maintenance, repairs and supplies such as oil and grease.

From these figures, the accountant can determine the direct, indirect or overhead, and total handling costs per unit actually handled, for accounting purposes. With this figure for a par-

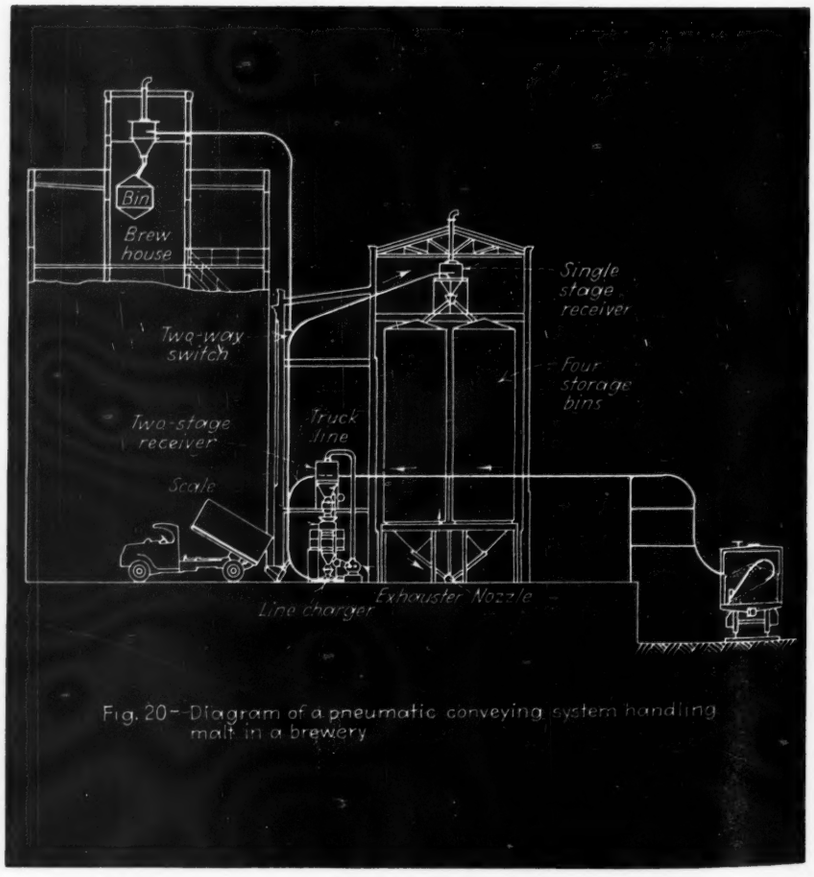


Fig. 20 - Diagram of a pneumatic conveying system handling malt in a brewery

Chutes, Elevators, Screw Conveyors

Inexpensive, Convenient, Automatic, Aid Gravity Flow

▶ *Equipment discussed in this article applies to the food industries in which free-sliding and granular, free-flowing materials are used as raw materials or ingredients or are finished products such as:*

Grains and Cereals
Seeds and Legumes
Flours, Meals and Feeds
Malt, Starch and Hulls
Sugar, Salt and Spices
Dry Leavens and Milk Powders
Cut Meats and Materials that slide easily
Containers that will slide easily

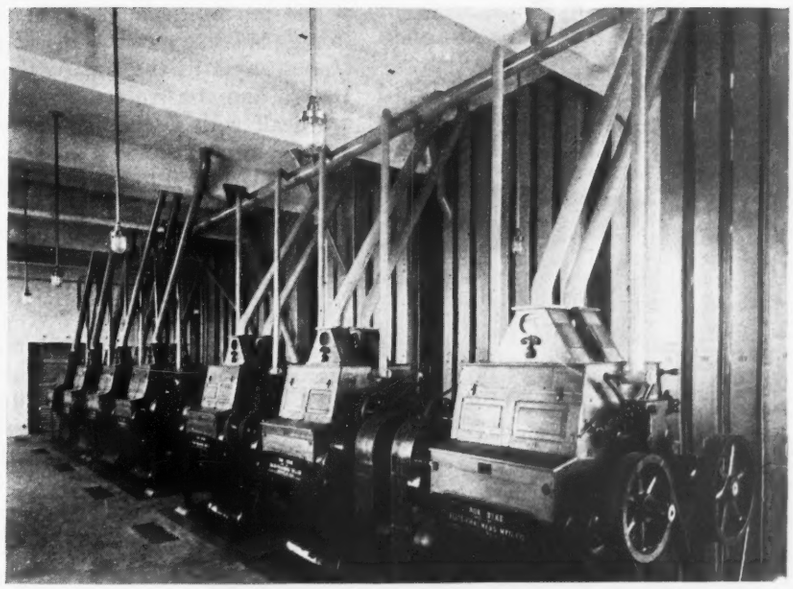


Fig. 4. A typical view of a grinding floor in a modern flour mill.

IN SOME branches of industry gravity flow plays an important part in the moving of raw materials and materials - in - process through the factory.

Use of gravity as a force for conveying materials from one point to another presumes these factors.

(1) That the materials move from a higher to a lower level. (2) That the character of the materials is such they can move freely from a higher to a lower level. (3) That there is equipment available for controlling the direction and the rate of this movement. (4) That the manufacturing operations or processes proceed through a succession of steps which lend themselves to the movement of materials from higher to lower levels.

Cut meats, packages, and similar objects are handled extensively by chutes but for the purpose of this article we shall confine ourselves to dry granular, free-flowing materials such as grains, cereal products, seeds, sugar, and similar commodities. These materials, even in finely divided granular form, will flow in a manner similar to liquids if given an opportunity. In fact the economic handling of these materials in connection with food manufacture depends upon the similarity of their flow to that of liquids moving through funnels, pipes, and troughs. In the case of these dry materials the equipment which controls the direction and rate of flow is classified as hoppers, spouts, chutes, and screw conveyors. Screw conveyors are power driven and, like belt and chain conveyors, are used when the direction of flow is such that gravity flow cannot operate.

Hoppers are used with spouts, chutes and screw conveyors as collecting units or as feed reservoirs. They may or may not be fitted with devices which regulate the discharge of their contents. These devices are known as slides or gates and may be a part of the hopper itself or may be located at a convenient place in the spout or chute.

In function, spouts and chutes for dry materials are comparable to downflow pipes and troughs for liquids. In design, they may be either circular or rectangular in cross-section and, in construction, may be of wood or metal. Also they may be straight or spiral; open or closed. Closed chutes are generally called spouts.

Screw conveyors are essentially troughs fitted lengthwise with a power-driven shaft having a continuous helical fin or projection which pushes the material to be handled from one end of the trough to the other as the shaft revolves.

Screw conveyors may operate horizontally or on an incline. In some instances they operate vertically as a screw elevator. In such cases they are closed, dust tight. The entire vertical screw is suspended from a top thrust bearing and made in matched section-lengths convenient for handling and form a continuous screw. Vertical screw conveyors will lift up to 50 ft. for practical purposes and will operate at a capacity rate of 50 to 60 tons per hour. Horizontal screw conveyors with a center or slightly off-side feed hopper or chute may have a right and left-hand screw to carry the material to discharge openings at both ends of the conveyor. Otherwise the feed is at one end of the conveyor and the discharge at the other with the screw operating only in one direction.

Inclined screw conveyors may move the material in an upward or a downward direction. They are used for the downward direction only when the angle of slope is too flat for the material to flow freely as through a spout or chute. In the form of an auger-packer the screw conveyor operates in a vertical or near-vertical downward direction for the purpose of imposing a forced feed of material into a container.

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All of these units of gravity flow equipment and screw conveyors, are used in conjunction with other types of conveyors, particularly elevators, unless very special conditions prevail. Under usual conditions the raw material such as grain would come to the plant at the ground or first-floor level and be elevated to storage bins at the top of the mill or to special storage buildings from which it would be conveyed to the top of the mill. Design and construction of elevators are dealt with in the articles on belt and chain conveyors.

These means of handling materials through gravity and screw conveyor flow are characteristic of the wheat flour industry. The modern wheat flour mill requires a very elaborate system of elevators, conveyors, spouts, chutes and the like to handle the different grain stocks resulting from the gradual reduction process of milling. By gradual reduction system of milling is meant the passing of wheat through a series of rolls and sifters to gradually convert it from grain form to finely ground flour and coarser feedstuffs.

The engineer in laying out the milling plant uses great care to locate the various pieces of milling equipment so that the various wheat products may be handled by gravity as much as possible. However, precaution must be taken against the use of spouts which are too flat. *Spouts as a rule should have angles of at least 35 deg. for wheat and 45 deg. for mill products.* Otherwise the plant is continually bothered with chokeups.

A typical line of elevators discharging through spouts to machines below is shown in Fig. 1. This is an arrangement of spouts and chutes in a flour mill of 800 bbl. capacity per day of 24 hours. Both elevators and spouting are of galvanized metal construction. Fig. 2 shows another view in this plant which illustrates the great use of gravity in a plant of this kind. Screw conveyors are necessary under certain conditions; particularly where the direction of flow is horizontal or at too small an angle of depression for gravity flow. A typical screw conveyor installation is shown in Fig. 3. These two conveyors, each 9 in. in diameter by 50 ft. in length, are provided for mixing and blending flour from the bins above. The lower battery of conveyors, also 50 ft. in length, feeds flour to bins above the packing department.

In Fig. 4 is seen a typical grinding floor in a modern flour milling plant. Note the uniformity of the spouting going to the grinding machines and the arrangement of the suction pipes to the main air trunk above. The suction pipes draw off the warm air and provide proper ventilation and plant cleanliness.

The success with which the various products in flour mills is handled through the use of gravity spouting and screw conveyors in conjunction with elevators, belt conveyors and bins leads to the conviction that in their use lies a solution to the problem of product handling in other food manufacturing plants. From a study of the small amount of power required to handle wheat and its milled products through the various steps of their conversion from grain to finished products there would likely come a suggestion on how to lower cost of plant operation.

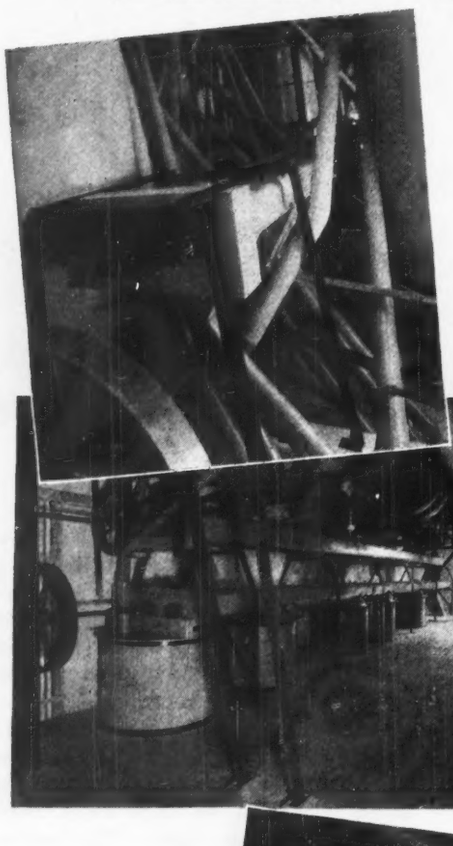


Fig. 2 (Above). In spite of the many spouts required in a 800-bbl. per day mill, screw conveyors may be called up to transport the milled products in a horizontal direction as shown in middle portion of this illustration.

Fig. 3 (Left). Screw conveyors are well suited for continuous mixing and blending of varous mill streams and for feeding the blended flour to reservoir bins over the packing department.

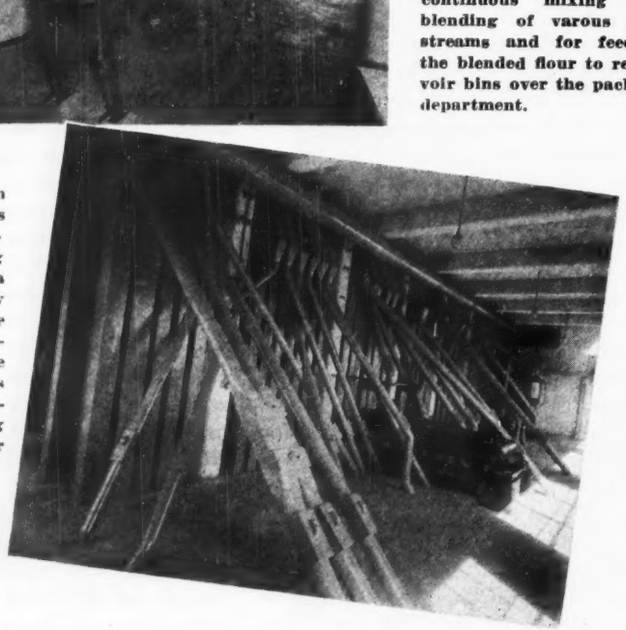


Fig. 1. Moving of grain and milled products through a flour mill consists largely of lifting them vertically to a point from which they can be spouted to the next machine in the production cycle. In the background are elevators discharging into close-connected spouts leading to machines at lower levels.

Belt Conveyors

Reliable, Flexible and Adaptable in Food Plants

MODERN mass production methods are represented in popular thought by the belt conveyor. The assembly line, so typical of present day manufacturing methods, works along some modification of this device. And this is as true in the food manufacturing industries, as it is of the automobile or radio factory.

Food plants use belt conveyors, or some modification of belt conveyors, for many purposes. Raw materials are handled into the plant on belts, and materials move from one operation or process to another in the same way. Finished goods move through the packaging, packing and warehousing departments on belts. In some cases, belt conveyors are used also for the actual shipping and loading operations.

There is one other very important use of belt conveyors. They often form an actual part of a production or packaging machine. Examples are found in traveling ovens or driers of the type having a built-in belt on which the material is carried through the heated zones. Belts are also often built into filling, packaging, labeling and similar machinery. Such belts should properly be considered part of the machine, and their operation should be discussed in connection with the operation or process carried out by the machine. For these reasons such belts will not be considered in this article, for it is confined to a discussion of belt conveyors which are not an integral part of any machine.

▶ The belt conveyor comes very close to being a universal tool of materials handling. It is used in

Every Branch of Food Manufacture

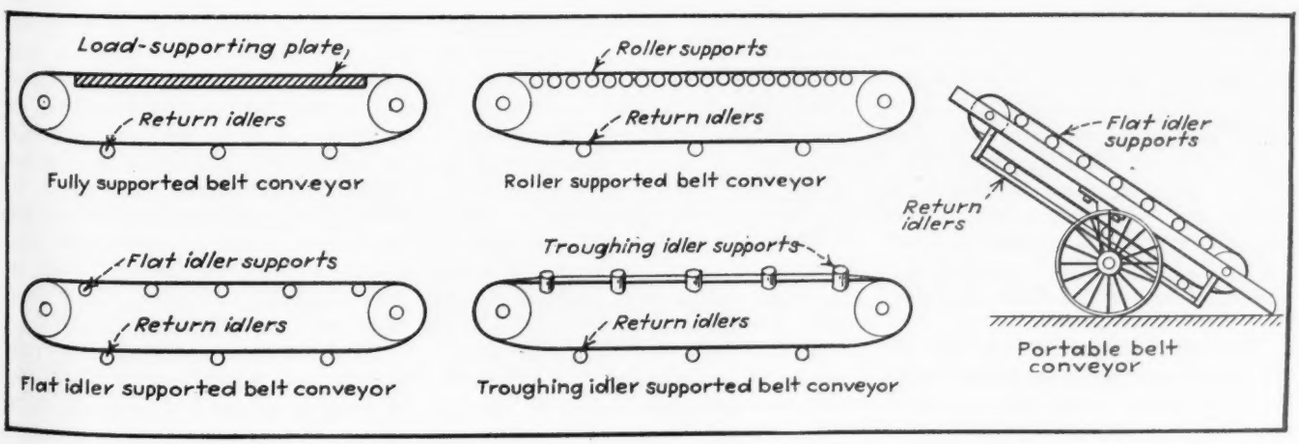
Belt conveyors have many important characteristics that have led to their use in food plants. One of these is smooth operation. When properly designed and installed, a belt conveyor will lie perfectly smooth, and move in such a way that objects will ride on its surface without tilting or spilling.

Another advantage of the belt conveyor is its adaptability. Belts can be made of a wide variety of materials, such as rubber, fabric, wire mesh, steel bands, steel chain, or flat steel or wood strips, to suit the demands of the operation being carried out. Many attachments can be fastened to belts, adapting them to the particular requirements of some certain line of work. If small changes in elevation are needed, belts can carry up or down inclines. Finally, belt conveyors can be combined readily with other types of conveyors, with work tables, or with machines, to make smooth working combinations.

The power requirements of belt conveyors are low, especially for the light weight belts and light loads generally handled in the food field.

Belt conveyors have a certain value from the manager's point of view that is deserving of mention. For example, consider an operation in which a belt conveyor, carrying a line of empty packages, serves a packing table. Packages are delivered at a predetermined rate. The operator is required to fill each package, and replace it on the belt, which carries it to the wrapping machine. If the rate of travel of the belt has been set at a speed best suited to efficient operation, then it will continually deliver empty packages to the operator at this best possible speed. In other words, the belt acts as the pace-setter for the work, always maintaining it at the point of best efficiency. This property is shared by certain other types of conveyors, notably the chain type, but the belt was the pioneer in this phase of management work.

Four general types of belt conveyors are available. These are the fully supported, the roller supported, the flat idler supported and the troughed idler supported. The first three of these are available with either plain belts, or with belts having flights or other attachments fixed to them.



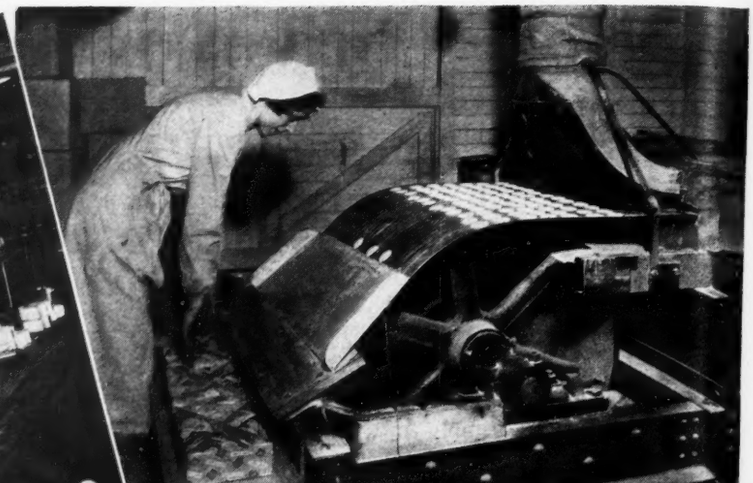


Fig. 1 Emerick Candy Co., Buffalo, N. Y., is only one of the many confectionery manufacturers who use a steel belt for their chocolate depositors and cooling tunnels.

Fig. 2 Spaulding Bakeries, Binghamton, N. Y., uses a 16-in. steel belt 16⅔ ft. long in its cake packing department.

Fig. 3 City Mills, Columbus, Ga., combines a bag and passenger elevator features in the modified belt conveyor operating vertically.

A fully supported belt runs over the surface of a plate, table or other piece of equipment, upon which it rests. This type of belt is that most often used with work tables, or it may itself serve as a work table.

Roller supported belts are belts in which the loaded part of the conveyor, whether top or bottom run, is supported on a section of roller conveyor. Such a belt conveyor is useful in loads made up of individually heavy objects such as filled cartons, bags and barrels. In such cases it holds the belt level and flat, without developing the excessive friction that would be had with a fully supported belt in such service.

Flat idler supported belts are the type most commonly met with in the food industry. They are suited to handling almost any type of bulk or packaged food ingredient or product, are simple to operate, and relatively inexpensive. The idlers consist of one or more small diameter pulleys, mounted on a shaft so that they are free to turn. Ball bearing idlers are often used. The idler shaft is mounted in any one of various available types of support, to suit the installation.

Troughed idler supported belts are supported on idlers of three or more pulleys, so arranged that the sides of the belts are bent upward. This gives the belt a cross-section like a trough, and enables it to carry granular or finely divided materials without spilling, in greater quantities than could be placed on a flat belt. These belt conveyors require flexible belts, usually of fabric and rubber. Another type of trough belt conveyor is a flat belt with built-up sides. These belts are used for materials having a considerable liquid content.

Belts for belt conveyors are of endless construction. The conveyors are provided with two pulleys, a driving pulley and an idler pulley. The driving pulley is connected to some source of power. It may be connected to an electric motor, through a speed reducer or variable speed gear. Or it may be driven by belt and pulleys from a line shaft. The motor drive is usual in modern practice. The idler pulley, at the other end of the belt, is equipped with a take-up, so that belt tension may be adjusted. The driving pulley is set always ahead of the load, which keeps the working surface of the belt under tension.

Various special auxiliaries for belt conveyors are made by the various conveyor manufacturers. Worthy of mention are the trippers, plows and other unloading devices. One example of the usefulness of these auxiliaries is the case of a belt serving a number of storage bins. An automatic tripper, under remote control, can be obtained. It will unload the belt into any bin, as desired.

One of the newest developments in the belt type conveyor for food manufacture is found in the steel band conveyor. The belt portion of this conveyor is of special steel composition which permits of direct contact with many types of food without corrosion or pitting.

It is pulley-driven like a rubber or fabric belt and permits of sufficient tension to keep a relatively uniform, flat surface for considerable distances between supporting rollers or idlers. A forerunner to this type of belt conveyor was a heavily tin-coated light steel belt which consisted of soldered segments and was fastened to side chains pulled by a sprocket drive. Rollers spaced every 3 ft. aided in keeping the upper surface reasonably level and free from sagging. The chains dragged along in side channels. However, steel band belts need no such driving aids.

Steel band conveyors are now available in belt widths up to 32 in. and in lengths as much as 500 ft. If a longer belt is wanted, two or more

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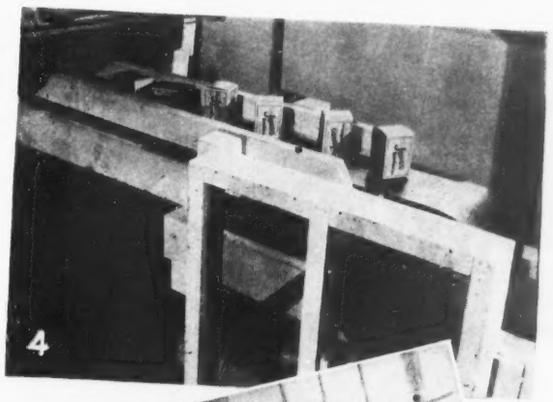
lengths may be joined together by a riveted lap joint. If belts wider than 32 in. are needed, two or more widths can be spliced along a longitudinal joint by either of two methods. One method provides for a continuous smooth surface. The other method gives a modified lap joint which sometimes interferes with using the belt as a surface upon which to deposit chocolate confections or bakery products.

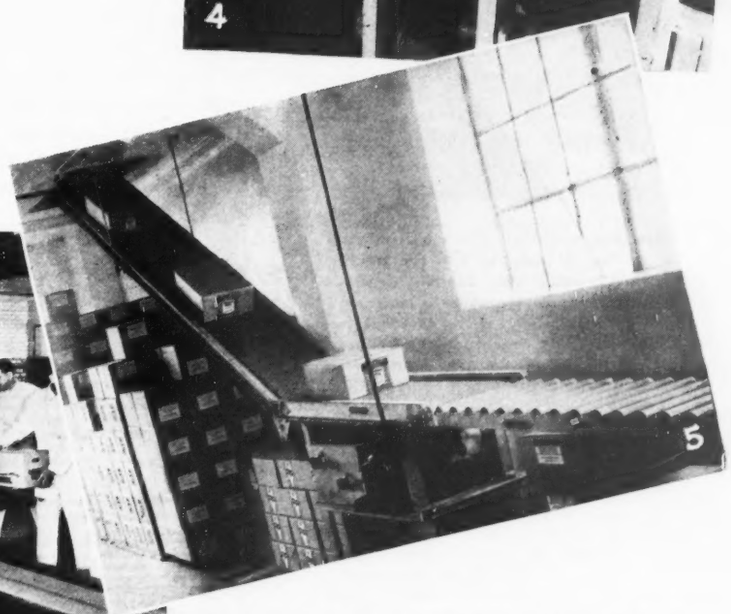
An outstanding use of these conveyors has been made in the baking and chocolate industries for an automatic tieup between machine units. In the baking industry these conveyors join the cutters, ovens, coolers, and packing tables into a complete automatic hookup. In the chocolate industry the conveyors connect the depositors, cooling tunnels and packing tables (See Fig. 1). Sometimes the portion of the conveyor between the end of the cooling tunnel and the drive pulley is used as a packing table for chocolate confections. More generally they are unloaded by a scraper apron which directs fall of the confections into boxes or pails (See Fig. 1).

Use of steel belts in these industries, as conveyors from one machine to another, is a small part of their function as conveyors because these machines often have a continuous or a very close hookup. While a portion of the belt is passing through the zone of operation of one of the machines, it is, in effect, a part of that individual machine. Quite generally the portions of the belt in the zone of machine operations greatly exceeds the portion transferring goods to other machines for further processing or packing. (FOOD INDUSTRIES, October 1932, p. 345; September 1935, p. 431; and September 1936, p. 453.)

Other industries make use of steel belt conveyors as sorting or packing tables. An example of this use is found in the cake baking industry (See Fig. 2). In the meat packing industry they have become standard equipment for the bacon slicing and packing department and for pork cutting and meat inspection purposes.

The sugar industry uses steel belt conveyors for handling both wet and refined sugar and for conveying hot char. In both cases the advantages of the steel conveyor lies in its capacity to handle large volumes of material without damage to the product or to the conveyor. The latter is particularly true with the hot char. In these services, very long belts of relatively narrow widths are used. Unless special precautions are taken there will be difficulty in keeping the belts on the pulleys. For belts of narrow widths vertical roller side guides serve quite well to keep them from running off the pulleys. Guides do not function so well for wide belts. Correct alignment of pulleys, carefully made lap joints, and pulleys with flat center faces tapering slightly to the ends are better aids to keeping





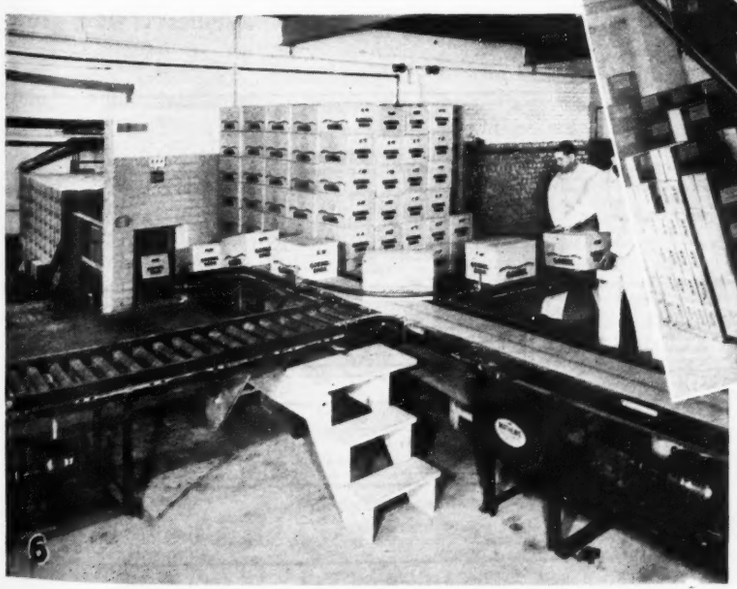


Fig. 6 Goebel Brewing Co., Detroit, Mich., reverses the direction of movement by elevating cartons of beer from the bottling floor to the storage floors on a flat belt conveyor. In this case the belt is supported by rollers and continues through flights from one floor to another. On each floor it joins with horizontal roller conveyors onto which the cartons may be deflected for stacking. The movement of both conveyors may be reversed if desired for flexibility. Pulley arrangement may be seen in right foreground for controlling tension on belt as well as regulating its speed through a reduction gear.

Fig. 4 At Jones Dairy Farm, Fort Atkinson, Wis., is an example of a simple flat belt conveyor. It is a fully supported belt for carrying cartons of sausages from the packing tables into the refrigerator room.

Fig. 5 Kraft-Phenix Dairies, Inc., Wausau, Wis., uses a fully supported flat belt conveyor in combination with a roller conveyor to lower cartons of malted milk from packing floor to shipping storage.

the belts on pulleys. Steel belt conveyors find their best use as horizontal conveyors and operating in a straight line.

Conveyors using belts of rubber, fabric, mesh, and wood or metal slat construction are not limited to horizontal operation. As a matter of fact, conveyors with fabric or rubberized belts are used at any angle in the food manufacturing industries throughout a range of from horizontal to vertical. When the angle to-

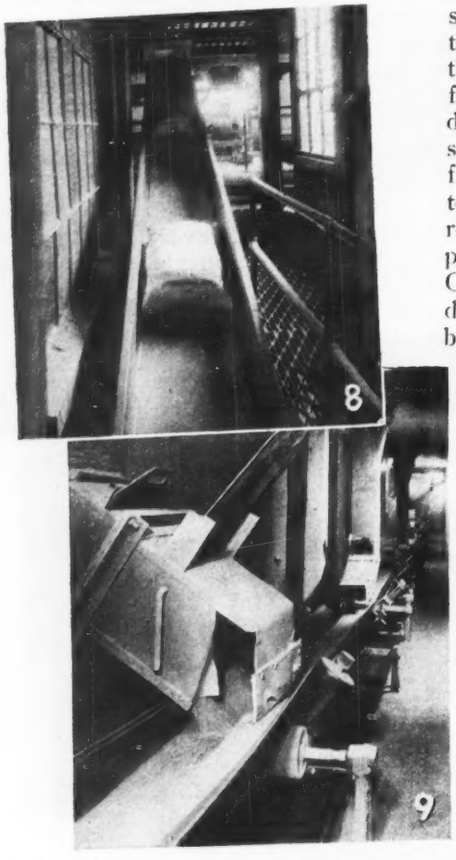


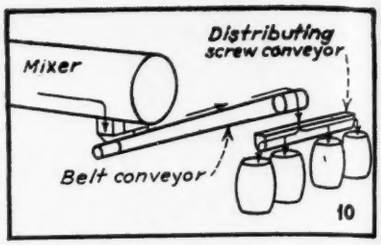
Fig. 7 Plan and elevation views of complete conveyor system in plant of Liberty Baking Co., Pittsburgh, Pa. The system includes both inclined and horizontal belt conveyors working in conjunction with chain-driven cooling conveyors and concaved bread chutes. Although cooling conveyors are chain driven they are essentially of mesh-belt construction.

Fig. 8 Eastern States Milling Co., Tonawanda, N. Y., lowers 100-lb. bags from upper floors to shipping area on a flat belt conveyor fully supported by a chute.

Fig. 9 Troughed belt conveyors cut the cost of transferring grain from storage elevator bins to the mill of F. W. Stock & Sons, Hillsdale, Mich. Chutes from individual bins discharge directly onto the belts which carry the grain to the mill.

wards the vertical becomes too great for friction on the belt surface to keep the material being conveyed from sliding or slipping, cleats, pockets, and other devices are attached to the belt surface. In some instances these devices take the form of small platforms or steps on which a bag, barrel, box, or even a person may be carried to a higher or to a lower level in the plant (See Fig. 3). More generally, for conveyors operating vertically, these devices are likely to take the form of buckets or pockets in which bulk raw materials or materials in process may be elevated to storage bins or feed hoppers. These conveyors find wide use in the handling of grain, flour, cocoa beans, and similar granular and free flowing materials which will feed freely into the buckets or pockets and discharge freely when these devices are inverted during passage over a head pulley. A special use conveyor of this type is found in the bake shop. It is used to convey dough portions from the rounder to and through the overhead proofer and finally to the loaf molder. One of the conveyors used for handling dough balls consists of a fabric belt attached to side bands at regular intervals in such a way that the fabric belt forms loops or pockets between the points of attachment. When handled on such an all-fabric conveyor the doughballs can be conveyed vertically, on an incline, or horizontally.

The ordinary flat-type belt conveyor is the one most commonly used throughout all branches of the food manufacturing industry. In its horizontal form it serves as a simple conveyor or as a combination of conveyor and work table. In its work-table function it is used as a cutting, sorting, inspecting, or packing table. If the materials handled are dry and



not easily contaminated, the belt itself is likely to be of fabric or impregnated fabric composition. Sanitary rubber-covered belts are most generally found on conveyors handling wet foods; particularly those susceptible to color and flavor changes and to contamination by microorganisms.

When used in simple conveyors the flat belt type may be used alone, (See Fig. 4) or in conjunction with other types of conveyors such as the roller, (See Figs. 5 and 6), the slat, chute, (Fig. 7), mesh, (See Fig. 11), or screw. In some instances these other conveyors serve as feeders to the flat belt, (Fig. 6), while in other instances the flat belt serves as the feeder conveyor, (Fig. 5). Where possible the flat belt is used because of its simplicity, its low first cost, and low upkeep. When handling heavy objects such as cases or cartons of bottled or canned foods, flat belt conveyors may be operated through an elevation or depression angle of approximately 30 deg. without cleats or other aids, (See Figs. 5, 6 and 8). However, for such uses, the flat belt is quite generally mounted on a roller conveyor instead of merely run over idler pulleys or flat supporting surfaces.

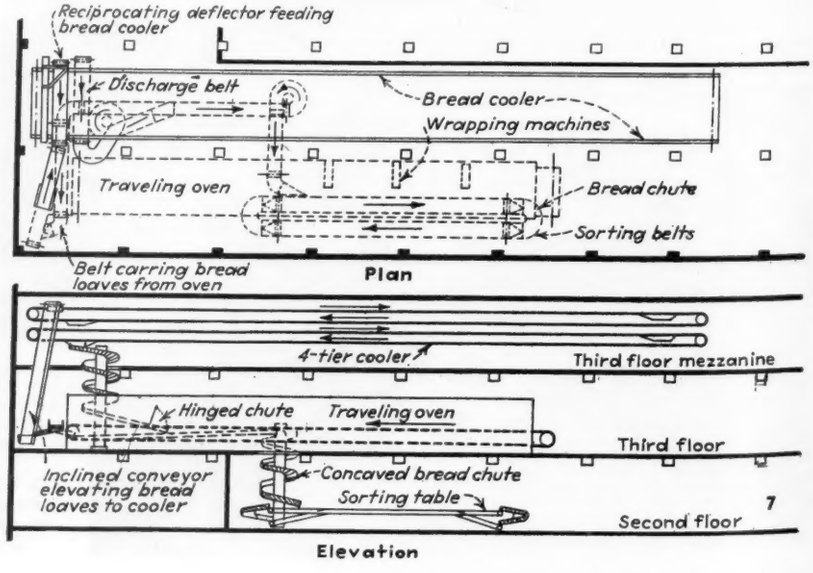
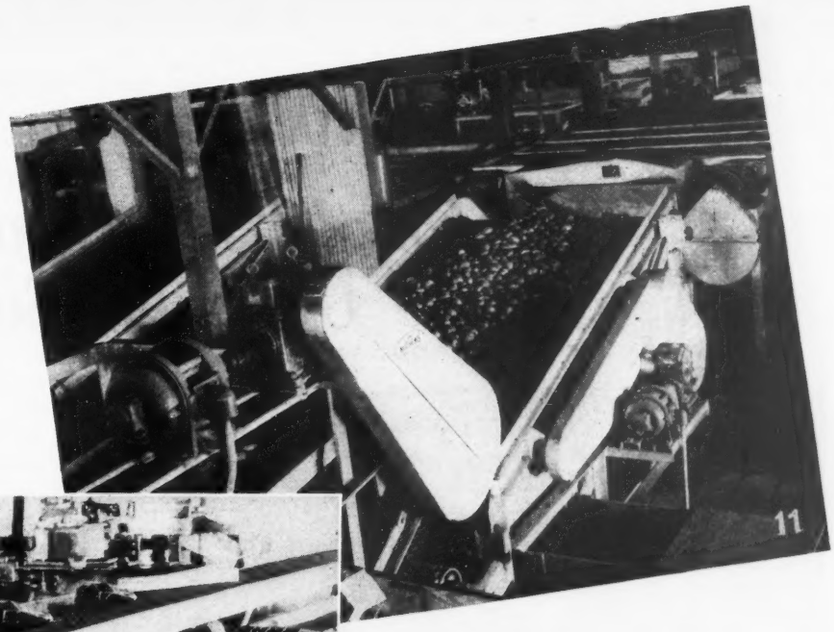
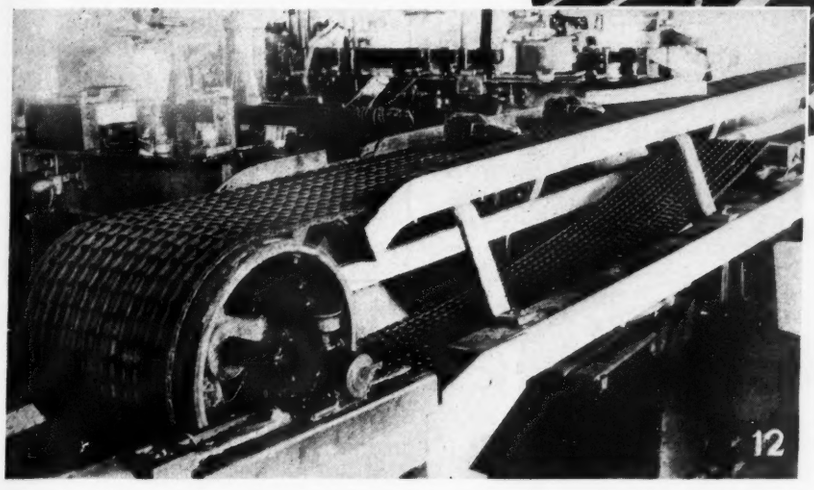


Fig. 10 Diagrammatic sketch of belt and screw conveyor setup for handling dry granular gelatin in plant of Atlantic Gelatin Co., Woburn, Mass.

Fig. 11 Hastings Potato Growers Assoc., Hastings, Fla., uses a mesh belt conveyor in conjunction with a flat belt conveyor in the cleaning, grading, and washing of potatoes. The flat belt carries the culls and dirt away for further separation. Canners, preservers and packers use mesh belt and slat belt conveyors for cleaning and grading fruits and vegetables for processing.

Fig. 12 Crosse & Blackwell, Toronto, Ont., prepares its glass-packed foods for labeling by carrying them through a cooling zone and a washing bath on a mesh belt conveyor.





A convenient modification of the belt conveyor is the trough-shaped belt conveyor, (See Fig. 9). It is used quite widely throughout the cereal industries for the handling of grain and malt. Troughed belt conveyors may be used individually or in combination with other troughed conveyors serving as feeders. They are generally used as connecting links between chutes and hoppers.

An example of the virtue of such a conveyor is found in the F. W. Stock & Sons flour mill at Hillsdale, Mich. This company now uses a troughed belt conveyor to transport grain directly from its storage bins to the top of its flour mill at a saving of approximately $1150 per year. This saving comes largely through the difference in cost of operating a 5-hp. motor instead of the original 25-hp. one. Previous to the conveyor installation the grain was transferred from the elevator storage bins to the mill through an 8-in. steel spout by gravity flow. Such an arrangement meant that the grain flowed 140 ft. to the bottom of the mill from where it was lifted to the top of the mill by a 25-hp. motor. The conveyor belt installation requires only a 5 hp. motor.

There was a slight saving in making the conveyor installation over the replacement of the worn-out chute and elevator installation. While that saving was a help, the big saving is due to the difference in power consumption and in maintenance expense. Grain is handled at the rate of 3,000 bu. per hour.

Another advantage of the conveyor method of handling dry materials is found in the Atlantic Gelatin Co. plant at Woburn, Mass., (See Fig. 10). In this case dry granular gelatin similar to granulated sugar in appearance and handling behavior, is transferred directly from a mixing drum to shipping barrels by means of a troughed belt conveyor working in conjunction with a screw conveyor. Before the conveyor installation was made, about two years ago, the barrels were filled by hand scoops direct from an open type mixer. With the present installation a drum mixer, 5 ft. in diameter, is used. It discharges directly into a troughed belt conveyor which delivers the gelatin through a brass chute into a screw conveyor operating at right angles to the belt conveyor. As one-half of the screw conveyor has a right-hand screw and the other half has a left-hand screw the gelatin is moved away in both directions and prevents clogging or overflowing. Four 350-lb. barrels can be filled at a time. One 2-hp. motor operates both the belt and the screw conveyors. The installation has a handling capacity of 5 tons of gelatin per hour. Sanitation as well as economy is a feature of this installation for gelatin.

Mesh belt conveyors (Fig. 11) find their best application in the washing of fruits and vegetables preparatory to marketing in their fresh state or to processing into canned or glass-packed foods. The diamond-shaped mesh works well for this purpose. In some instances they are used to convey bottles of catsup and the like through a washer preliminary to labeling (See Fig. 12). Here the square-mesh belt is likely to be used.

Slat belt conveyors are heavy duty units and find use as floor conveyors for barrels, boxes and bags. As inclined conveyors they are used for boxes and cartons as well as for feeding fruits and vegetables to mesh conveyors in the cleaning, grading and washing department.

Another special type of conveyor which finds wide use throughout the food manufacturing industries is the portable conveyor. It is manufactured in several different styles: (1) flat belt, (2) trough belt, (3) flat-belt with cleats, (4) slat belt for freight, and (5) sectional trough belt.

Roller Conveyors

Simple, Adaptable Designs Use Gravity, Save Power

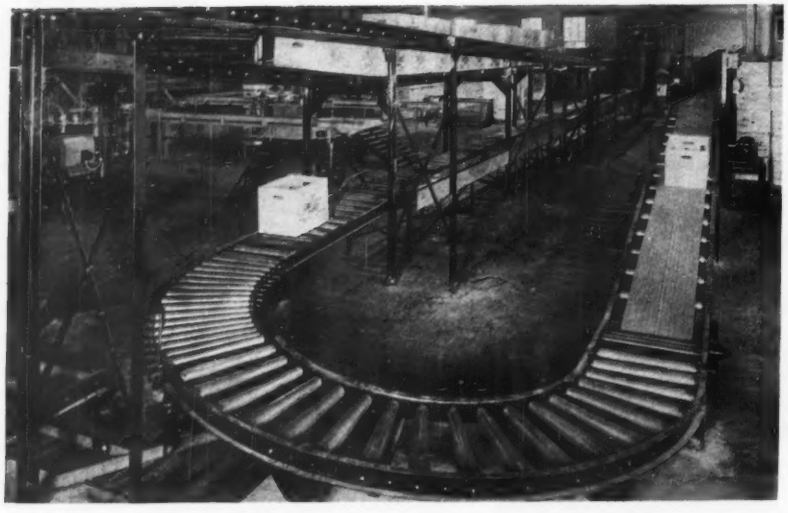


Fig. 2—In the Minneapolis Brewing Co. plant long lines of gravity roller conveyor are combined with belt conveyors and other devices to eliminate all manual handling operations and trucking.

Roller conveyors will handle containers, cases, boxes, or any objects smooth enough not to catch on the rollers. Available in any length, this material handling device has proved to be useful in most food processing operations and the warehouses of

All Food Manufacturing Industries

A STRAIGHT LINE is the shortest distance between two points. And when those two points are on the same floor level, a gravity roller conveyor is the simplest means of moving goods along that straight line. It saves money too, because it requires no power.

Unfortunately, these roller conveyors will not handle every type of material. They are best suited to use with rigid and fairly bulky objects, such as boxes and cartons, or the cases used for milk bottles or other beverages. Being made up of a series of rollers, with spaces between, small objects will fall through the conveyor or jam between two rollers. A fairly smooth and level under side helps a product to travel on a roller conveyor. Fortunately, many products that do not fulfill these requirements, can be placed on trays, or in baskets or other containers. Then they will move on gravity rollers as well as any shipping case or carton.

The conveying portion of a gravity roller conveyor consists of a series of rollers such as that shown in the accompanying sketch, Fig. 1, mounted on shafts fixed in a structural steel frame, and equipped with ball bearings to enable them to turn with the least possible friction. The shafts of these rollers are set in the frame with a distance between each pair of shaft center lines chosen to suit the service which the conveyor is to render.

The frame carrying the rollers is mounted on structural steel legs. The length of these legs is chosen so that the conveyor has sufficient slope to cause the objects being conveyed to roll from one end of the conveyor to the other by the action of the force of gravity alone.

This is the simplest form of gravity roller conveyor. Movement in other than a straight, approximately horizontal line is possible through modifications. For instance, to convey around a curve the structural members that hold the roller shafts are bent to the radius of the curve. The roller shafts are then set in these members radially, while the rollers are tapered. To convey from an upper to a lower level, use is made of what is called a roller spiral conveyor. In this, the side members of the conveyor are shaped as a spiral, and tapered rollers are set in radially. In both these cases, the slope of the conveyor is arranged so that the objects will move along by the force of gravity, but the slope is kept low enough so that they do not attain high speed.

Often it is desired to move objects up or down a short incline, the remainder of the movement being carried out on roller conveyor. This is generally done by means of a short length of belt conveyor, fed by roller conveyor at one end, and discharging onto roller conveyor at the other end.

Another problem encountered in the use of roller conveyors occurs when it is necessary to move the material over a strictly level stretch of conveyor. This can be done by means of a belt, or by using what is called a "live" roller conveyor. In "live" roller conveyor, the rollers are driven through gearing, from an electric motor.

Roller conveyors are among the most used materials handling means in the food industries. Raw materials are often received in containers that can be moved on these conveyors. Many finished products are packed in

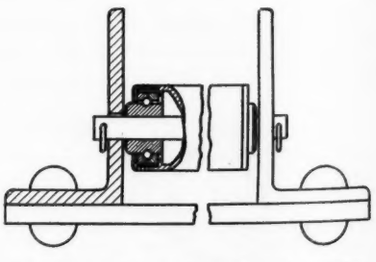


Fig. 1—Partial cross-section of a roller used in gravity roller conveyor, showing shaft, bearing and supporting frame.

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containers suitable for this type of movement. Therefore, handling into and out of storage is done in this way in many plants. For the same reasons, warehouse handling and shipping handling are often done this way.

These uses of gravity roller conveyors indicate the general usefulness of this type of equipment. In addition, many uses for similar purposes will be found throughout the food field. Some specific examples from recent installations will make the general utility of gravity roller conveyors evident.

For instance, when the Minneapolis Brewing Co. commenced operations after the repeal of prohibition, it installed a complete handling system, based on the use of gravity roller conveyor. The object of this system was to provide continuous flow through the plant and to eliminate warehouse trucking. In general, it makes use of gravity roller conveyor, inclined belt conveyor elevators, a spiral chute for cases, and live roller conveyors.

This system takes cases of empties from trucks and railroad cars, into storage, to bottle washers, and to bottle filling equipment. Filled bottles, in cases, are also moved to storage and to the shipping platforms. Canned beer in cartons, and cartons of empty cans are also handled on the same system. Fig. 2 shows roller conveyor lines used for handling cases in this brewery. Note the radial switch in the left foreground, and the inclined belt at the right.

It is claimed for this system that it avoids any unnecessary manual handling and makes possible high output at low handling cost. As evident from the photograph, maximum advantage is taken of gravity in this system, keeping power costs at a minimum.

Another example of handling by roller conveyor is shown by Fig. 3. While this view was taken at the Fort Pitt Brewing Co., it shows a method of handling suitable for any product packed in a shipping carton.

The brewery receives its empty beer cans packed in fiber containers. From the receiving platform these containers are raised by a vertical lift tray elevator. The containers pass over the top of this elevator, and on the downward run are discharged onto the roller conveyor, as shown in the photograph. Elevator capacity is 20 cartons per minute. Note the switch in the roller conveyor. This permits delivery of cartons to any point on the storage floor, as desired.

Packing operations are frequently among the high cost activities in the food plant, especially where much hand labor is involved. One way to lessen this cost is shown in Fig. 4, where girl operators are packing "Chicken Dinner" bars in the plant of Sperry Candy Co. Here space is at a premium and there is no room to bring in supplies through the aisles. So the packing tables are completely served by conveyors. The roller conveyor at the top brings empty boxes to the operators, and also trays of unwrapped candy bars. The girls wrap the bars and fill the boxes, which are then placed on the belt conveyor which runs beneath the roller conveyor. At the end of the room are shown three conveyors bringing box covers in to meet the filled boxes.

Roller conveyors also fit well into shipping operations. Fig. 5 shows a scene in the Indianapolis plant of Kingan & Co., meat packers. Outgoing shipments come to the scale on a roller conveyor. A section of this conveyor although lined up with the remainder, is mounted on the platform of the scale. The shipment is weighed. It is then removed from the scale for sealing, after which it is returned to the conveyor. From the gravity conveyor it is discharged onto an inclined belt conveyor, which raises it to shipping platform.

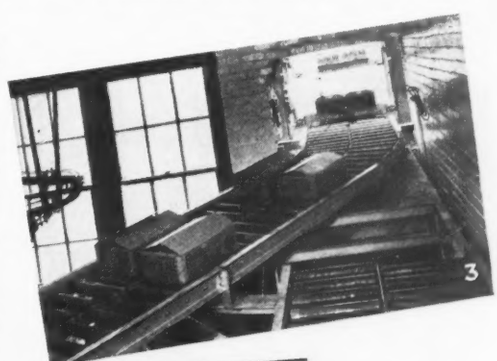
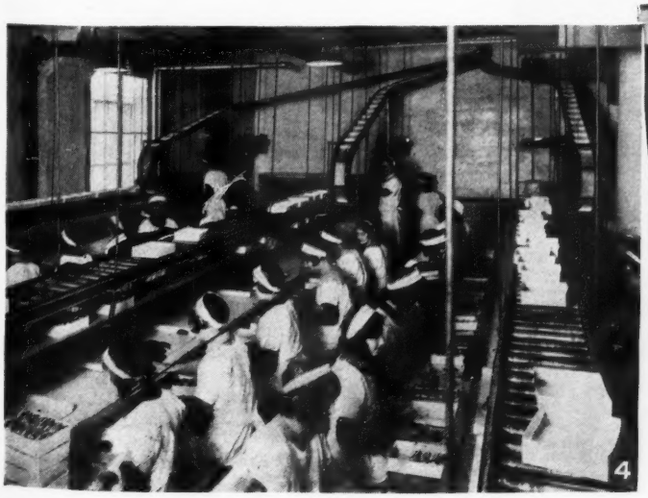
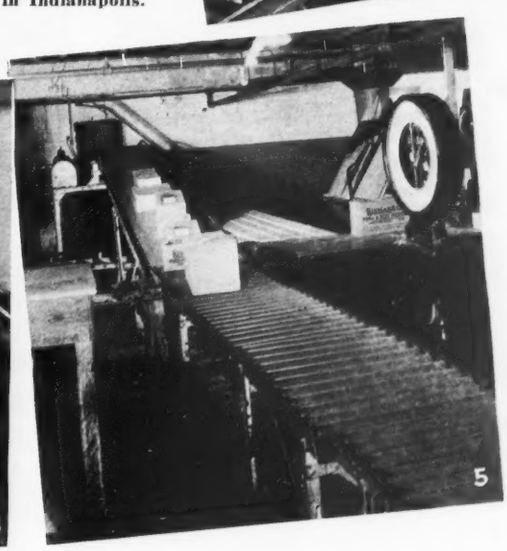


Fig. 3—Entire storage spaces can be served by roller conveyors, as in this installation at Fort Pitt Brewing Co.

Fig. 4—This packing department of the Sperry Candy Co. shows how gravity roller conveyor can be used in combination with belts to conserve the workers' time.

Fig. 5—Gravity roller conveyor mounted on a scale platform, and placed in a roller conveyor line, saves time and labor for the shipping department at Kingan & Co. meat packing plant in Indianapolis.





Chain Conveyors

Convey Around Corners Give Positive Timing

POSITIVE, continuous motion along a varied path is the property of chain conveyors that makes them different from belt conveyors. When materials must be handled from one level to another, both up and down and also around corners, a chain conveyor will do the work. Of course, the same result can be obtained by using a combination of several conveyors of other types. But where the work is to be done by one conveyor, a chain is used.

Starting with this requirement long years ago in the sawmill and paper pulp industries, chain conveyors are now a tool of all industries. As their worth has become known, chains have also come to be used for other purposes.

In its simplest form, a chain conveyor consists of an endless chain running over a head, or drive, sprocket and a tail sprocket, with other sprockets, or guides, inserted wherever a change in direction is made. The early log conveyors placed such a chain at the bottom of a wooden, V-shaped trough, in which the logs rode, lengthwise of the chain. To insure movement of the logs, lugs were attached to the chain at appropriate intervals.

The simplest chain conveyors used today in the food industries are of practically the same design. The chief difference is that some sort of steel runway has often been substituted for the wooden trough. And often the roughnesses of the chain it-

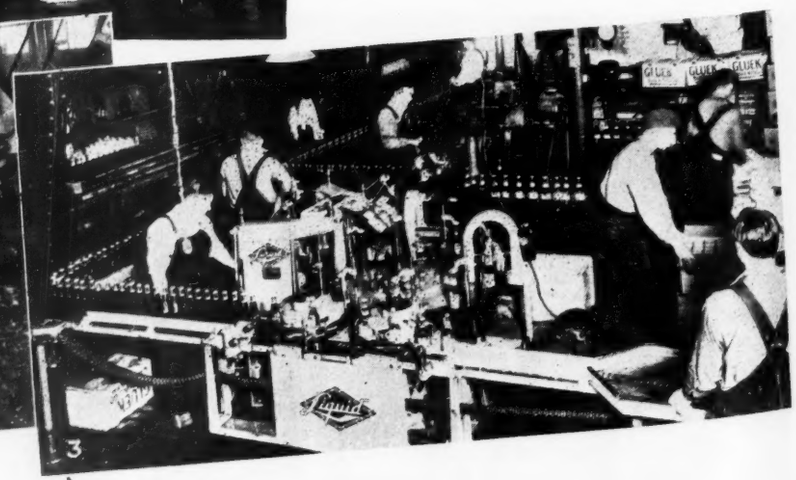
▶In addition to moving goods with accurate timing, permitting definite tie-ups with production machinery, chain conveyors can move up, down and around corners. One chain conveyor can do work that would require several conveyors of other designs, in such industries as:

Bakery Products
Beverages
Candy
Canned Foods
Cereal Products
Chocolate Products
Flour
Ice Cream
Milk
Meat Products
Starch
Yeast

Fig. 1—This simple chain conveyor delivers pineapples, regularly spaced and at definite intervals, to a Ginaca machine in the Honolulu canning plant of Hawaiian Pineapple Co.

Fig. 2—Chain conveyor of this type is much used for handling cans at speeds synchronized with filling and closing machines.

Fig. 3—Bottling plants, such as that of Gluek Brewing Co., depend on chain conveyors for moving bottles through filling, capping and labeling machines at synchronized speeds.



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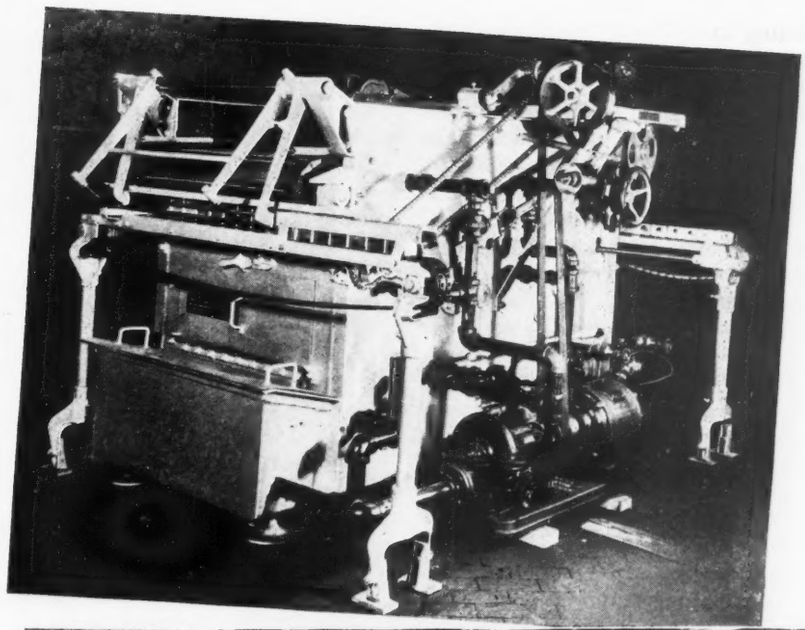
self are sufficient to engage the objects being handled, so that the lugs are omitted.

Such conveyors are widely used for handling bottles, cans, cartons, boxes, cases of bottles and many other articles having a level bottom, so that they will ride without tipping.

A simple modification, used where loads are heavy, is to run two or more chains side by side. Such a conveyor might be used where heavy containers are to be handled.

Another modification is to use two chains, running parallel, but a suitable distance apart, and carrying between them a series of trays or other load-bearing fixtures. This group includes tray conveyors, tray elevators, pusher bar and scraper conveyors.

Chain conveyors of the slat conveyor type are made up of one or more chains carrying fixtures upon which the load is placed, on the upper surface of the chains. Included in this group are slat, apron and pan conveyors. In general this equipment is used for heavy duty service. Two-chain conveyors, carrying open-mesh or slatted trays are used for cooling bread, washing produce and similar applications. Single and two-chain conveyors, carrying buckets, trays or platforms are used for elevating materials, as in bucket elevators, or for both elevating and horizontal movement, as in pivoted bucket carriers.



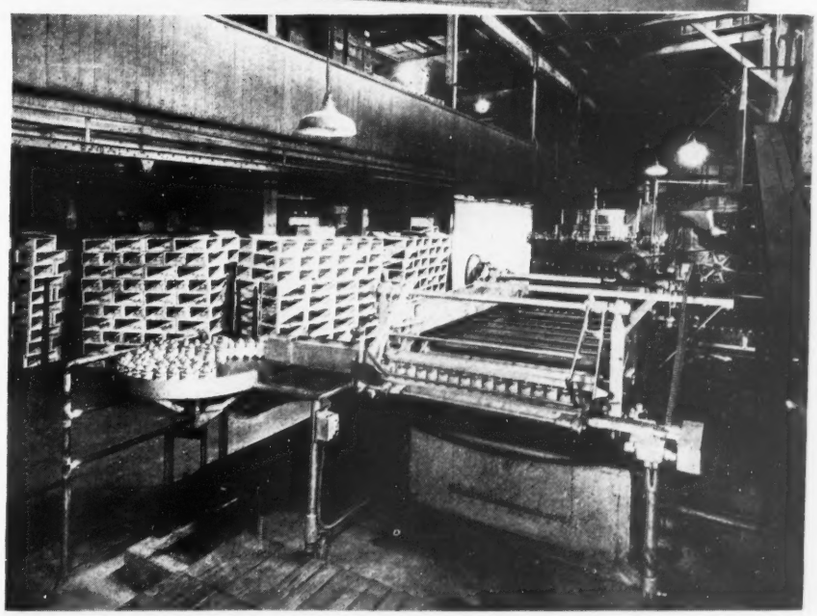


Fig. 5—Two-can washing installations using chain conveyors, one at Rainier Brewing Co., and the other at the Montevideo plant of an American meat packing company. This recently introduced operation depends upon chain conveyors to move the can through the washer at the correct speed.

Fig. 4—Pans attached to a chain conveyor are a convenient way of keeping these dressed chickens and the extracted organs together during inspection.

Chains are also used for conveying in another class of conveyors. These are the overhead type, where the load is suspended from the chain or from a track. The uses of this type of conveyor are so different from the uses of the chain conveyors operating beneath the load as described in this article, that a special article dealing with the overhead type will be found elsewhere in this issue of FOOD INDUSTRIES.

An illustration of the simplest type of chain conveyor is shown in Fig. 1. This is a conveyor for feeding pineapples into the Ginaca machines in the Honolulu plant of Hawaiian Pineapple Co. (See FOOD INDUSTRIES, April, 1931, p. 144.) It consists of a single chain, running in the bottom of a wooden trough. Attached to the chain at regular intervals are specially designed lugs. Each of these is used to move one piece of the fruit. This conveyor feeds the machine at positive intervals, at the same time making a count of the pineapples that are processed.

Chain conveyors of simple design are standard in many canning and preserving plants for moving the containers through filling, ex-

hausting and closing machines. Such a conveyor is shown in Fig. 2. Here the chain, running between guide rails, is equipped with attachments in the shape of flat pads which make the working surface approximate that of a belt. A chain used in this way, because of its positive drive, can be synchronized with the machine.

Another example of a simple chain conveyor is that shown in Fig. 3. This use is characteristic of the beverage and brewing industry. The chain running between guides, carries the filled bottles of pasteurized beer on its surface, delivering them to the labeling machines. This is another example of synchronized movement between a conveyor and a machine.

Where a certain group of materials are to be kept together during processing, the natural thing to do is to place them in a tray or pan. Where it is desired to have these pans pass a given point at a definite rate per hour, the positive drive feature of a chain conveyor serves well. Such a conveyor is shown in Fig. 4. Here each dressed chicken together with the organs removed in dressing occupies a pan. This pan is fixed to a conveyor chain, and moves past the inspector at a speed suitable for his work. In addition, note that the inspector is provided with a switch, so that he can stop the whole line, if necessary.

Fig. 6—Chain conveyors can travel around horizontal as well as vertical curves, as indicated by this installation in the chill room, Dairymen's League Cooperative Association in New York.

Fig. 7—The warehouses of the Sumner, Wash., plant of Fleischmann Yeast Co., and the Albion, N. Y., plant of Snider Packing Co., find chain conveyors of the wood apron type useful in moving boxes and cartons along the level and up and down inclines.

Sometimes two or more different types of chain conveyors are needed to carry out an operation. A recent example is found in the can washers developed by Barry-Wehmiller for washing cans for beer and other products. In Fig. 5 are two views of this combination, showing beer can washing at the Rainier Brewing Co., San Francisco, and corn beef can washing at the Montevideo plant of an American meat packer. The principle is the same in both machines. Two chains, running parallel and close together, provide a flat topped conveyor that moves the cans in single file. A chain conveyor having two chains widely spaced and carrying bars attached to the two chains and extending between them, works at right angles to the can motion on the first conveyor. The bars on this second conveyor each remove a number of cans from the first conveyor. These rows of cans are then slid over a plate as a unit, passing into the washer. At the washer exit, the same conveyor feeds the cleaned cans to the filling line, which is a single file conveyor like the first one. In beer can washing, these conveyors operate at speeds as high as 200 cans per minute. The movement is exactly synchronized to that of the filling line at any speed.

Conveying material around corners is no trick at all for a chain conveyor. This ability is particularly useful in handling milk cans, cases of bottle goods, and other spillable

or tipable objects. The chain conveyor moves these objects at a steady pace and smoothly, avoiding any possible jarring, jolting or tipping. Probably the earliest conveyor chains of this type seen in the food industries were those constructed by Mojonnier Bros., manufacturers of dairy plant equipment. Since then, many conveyor manufacturers are supplying chain for the same purpose. In Fig. 6, is shown part of the chill room of the Dairymen's League Cooperative Association's plant in New York City. This photo shows part of an extensive double chain conveyor used for handling milk cans and bottle cases.

Slat conveyors and other similar chain conveyors are widely used in installations where both horizontal and inclined motion are desired from the same equipment. These conveyors consist of two roller chains, operating in parallel. The chains roll on steel supports forming part of the conveyor structure. Attached to them, and carried between them, are the load carrying slats, trays, aprons, or other attachments. Fig. 7 shows two such conveyors, one in the Sumner, Wash., plant of Fleischmann Yeast Co., and the other in the Burt Olney plant of Snider Packing Co., at Albion, N. Y. Both of these are serving warehouses. The Fleischmann apron conveyor has every sixth wooden bar extending above the others, to prevent boxes from slipping when moved on a steep incline. In both cases, the conveyors replace trucking installations, saving time and labor, and eliminating the confusion of cross-trucking.

Another design of this general type of chain conveyor is arranged so that the load-carrying trays can pivot, thus holding the load upright while the conveyor carries the trays back and forth, and up and down. Such a conveyor is installed at Thin-Shell Candies, Inc., in Chicago. It is used for cooling cookies. Hot trays from the ovens are placed in the tray hangers and remain there throughout the travel through the cooler. The conveyor moves them first up to the top, then back and forth five times until they reach the last level. Here the trays are automatically transferred to the packing table conveyor. Total travel is about 350 ft., during which the cookies are cooled from 200 to 90 deg. F. The conveyor moves the trays of cookies smoothly, without jar or jolt. Consequently breakage is avoided.

The Redler conveyor, a type that causes the material to move along a casing with the chain, is discussed at some length in the article appearing on pages 493 to 500 of this issue of FOOD INDUSTRIES. This type of conveyor, used for handling granular or finely divided materials, is coming into wide use in food manufacturing plants. One use is shown in Fig. 8. Here is shown the loading hopper of a Redler conveyor, collecting soy beans from spouts beneath the storage bins. Fig. 9 shows another Redler in the same plant, equipped with a movable discharge spout, to serve any one of five discharge openings. This conveyor also is offset upward to gain extra height for discharge through spouts to distant points. In Fig. 10 is shown a "Roundaround" Redler conveyor, used for collecting starch from a number of feed spouts and bringing it to a common discharge spout for bag loading. All three of these conveyors have the common purpose of avoiding a dust hazard.

Many other variations of the chain conveyor exist, but the examples given indicate the broad utility of this equipment and the reasons for its selection.

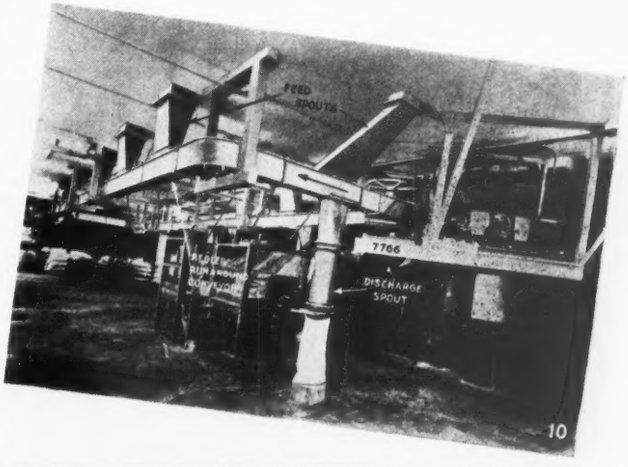


Fig. 8—Three chutes feed soy beans into the loading hopper of a Redler conveyor at the Lafayette, Ind., plant of Ralston-Purina.

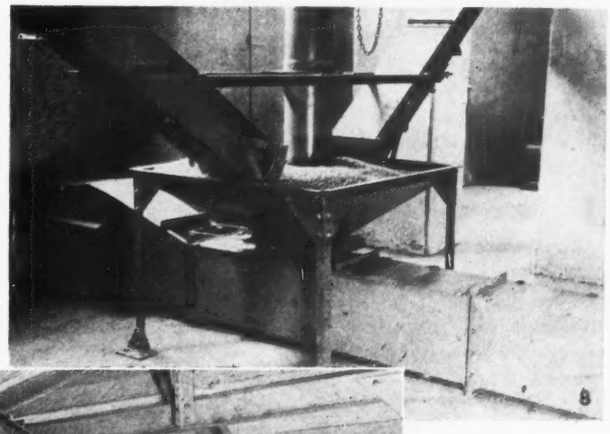
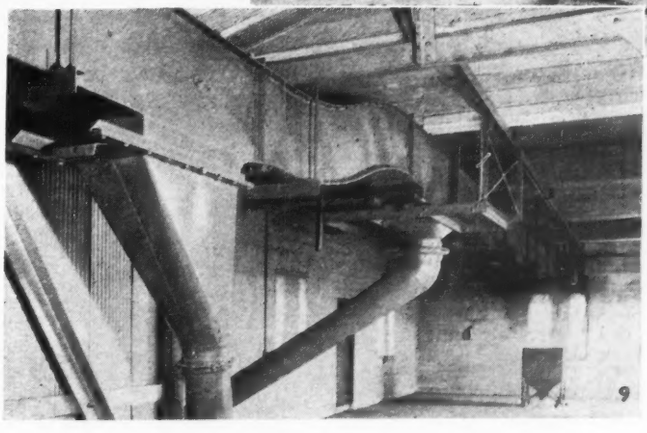


Fig. 9—A movable discharge spout serves this Redler conveyor at five outlets, in the Ralston-Purina plant at Lafayette, Ind.

Fig. 10—A Redler "Runaround" conveyor collects starch from many downspouts in this Mid-Western plant, delivering it to one discharge point for bagging without allowing any dust to escape.



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Overhead Conveyors

Suspend Goods for Easy Processing Also Leaves the Floors Clear

Better ways to use overhead track conveyors and other overhead conveyors are being developed. And however these conveyors may be used, in all cases they keep the floor clear. Food industries in which these conveyors have definite applications include:

Baking
Bottling
Canning
Meat Packing
Pickling
Preserving
All Warehouses

OVERHEAD conveyors are like the retractable landing gear of the modern airplane. When not in use they are out of the way. They leave the floor space clear and contribute to sanitary conditions in the plant. Nor is that everything. The overhead conveyor suspends the material being handled into clear space below it. This permits free contact with cold air, hot air or smoke. In chilling, drying, smoking and thawing operations this is an important consideration. Free suspension also is desirable where hand operations are to be performed on the material, as on the killing and dressing floor of the meat packing plant. And, of course, overhead conveyors do away with the wear and tear on the floors caused by trucks.

Two general types of overhead conveyors are used in the food field—the chain-trolley and the monorail. The chain-trolley conveyor consists of a single endless run of chain supported at regular intervals by trolleys, or rollers, which run on a track.

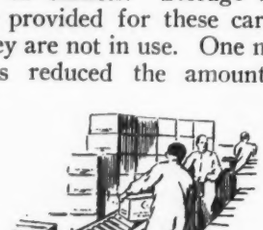
The monorail conveyor, as the name implies, is a single run of rail, or track, along which trolleys travel. The trolleys are not power driven as used in the food industries.

Very often, a power-driven chain is used in conjunction with a monorail to move the trolleys along, lugs on the chain engaging the trolleys. Some plants find it advisable to install monorail conveyors throughout the factory and supplement these with chains at points where power is needed to move the materials. Meat packers do this. They find the system highly efficient.

The chain itself finds wide application in many industries as an overhead conveyor. And while not common in the food field, there are, no doubt, operations in which it would be suitable. In construction, it consists of a continuous chain suspended at intervals on rollers or sprockets and operated by power.

A big advantage of the monorail conveyor is that rails can be installed at intervals of a few feet over an entire room. Arranged in parallel and connected through switches to a rail running at right angles, these conveyors permit material to be transported to any point in a room. Such an arrangement is found in chilling rooms and smoked-meat handling rooms of packing houses (Fig. 1). With the proper arrangement of branch and main-line rails, material can be removed from any part of these rooms without disturbing the meat at other locations.

With overhead conveyors, some device must be used to suspend the material from the chain or the monorail trolley. The simplest arrangement is a hook. Beef and pork carcasses are hung from hooks. Where small units of material are handled, they are carried in batches on racks or in baskets. Storage space must be provided for these carriers when they are not in use. One meat packer has reduced the amount of space required by using collapsible racks.



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Many food industries—nearly all, in fact—find overhead conveyors efficient for transporting a variety of materials (Figs. 3, 4, 5, 6, 7). This equipment is especially suitable where material is handled either in large pieces or in batches. Where material flows continuously in small units, a conveyor of another type would be better. Belt and roller conveyors probably would be more efficient under such conditions.

But the best way to indicate what use may be made of overhead conveyors is to show what typical food plants are doing with them. A plant which handles materials quite efficiently on monorails is the Brooklyn, N. Y., branch of John Morrell & Co. Large shipments of cuts and carcasses from three Mid-Western plants go into its coolers for distribution later to the New York market. To avoid a large labor cost and cluttering up of the plant, the meat must be moved in and out in systematic fashion.

No sooner are the beef carcasses taken out of the freight cars than they are hung on monorail trolleys. And they never leave the monorail until they are put into trucks for delivery to retail stores. Immediately after they are unloaded, the carcasses are conveyed by monorail to a sales cooler equipped with a network of monorails interconnected with switches. When the sales cooler has been filled, the carcasses then move to an elevator, where, still supported on a monorail attached to the elevator roof, they are lowered to a cold storage room one floor below. Here they come off the elevator monorail onto one connecting with twelve rails extending the length of the cooler, permitting the carcasses to be moved to any point in the room. Naturally, the meat travels back to the sales cooler by the reverse route. Then, as the carcasses are sold, they move from the sales cooler along a monorail extending the length of the loading platform and serving trucks.

The conveyor system for moving

material through the processing department of the Morrell plant is equally efficient (Fig. 1). Handling by monorail starts at the soaking vats. Here the cured pieces of meat are put into large baskets. Then they are lifted into the soaking tanks by an electric hoist operating on a monorail (Fig. 2). When soaking is completed, the hoist lifts the baskets from the tanks and conveys them to a washing table before the smokehouse door. There the pieces are washed, placed in stockinets and hung on the crossarms of the traveling smokehouse. After smoking, they are taken out and hung on racks suspended from trolleys on a rail passing in front of the smokehouse. This rail leads to the smoke-meat hanging room where it connects with a network of 22 rails extending over the entire room. Another monorail connects this room with the elevator which lowers the meat to the shipping platform one floor down. There a rail leads to a smoked-meat room from which orders are made up for delivery by truck. Both in the processing room and on the shipping platform, the monorails pass over a scale and the meat is weighed while on the conveyors.

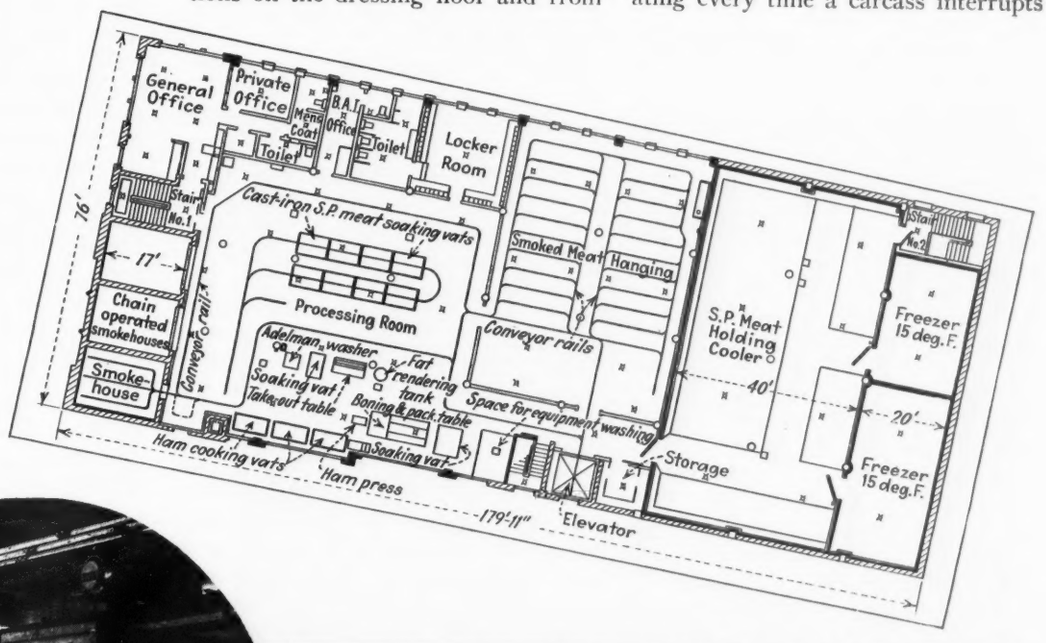
The meat packing industry also makes good use of combination chain and monorail conveyors. Slaughter houses find these effective for moving carcasses through the various operations on the dressing floor and from there to the chilling room. An ultra-modern refinement has been made in this system in the new beef house of Armour & Co., Chicago. This plant has two viscera tables so that government inspectors can keep pace with the killing and skinning departments. So it is necessary to switch the carcasses first to one table and then to the other, alternately. A photoelectric switch does this, operating every time a carcass interrupts

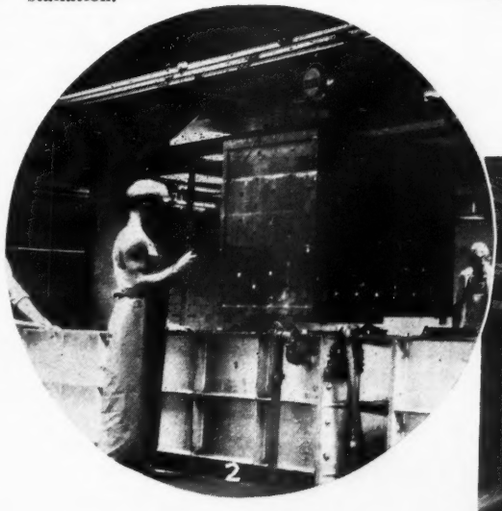
Fig. 1—Efficient arrangement of monorails in processing department of Morrell plant in Brooklyn, N. Y. Conveyors serve soaking vats, smokehouses and smoked-meat hanging room.

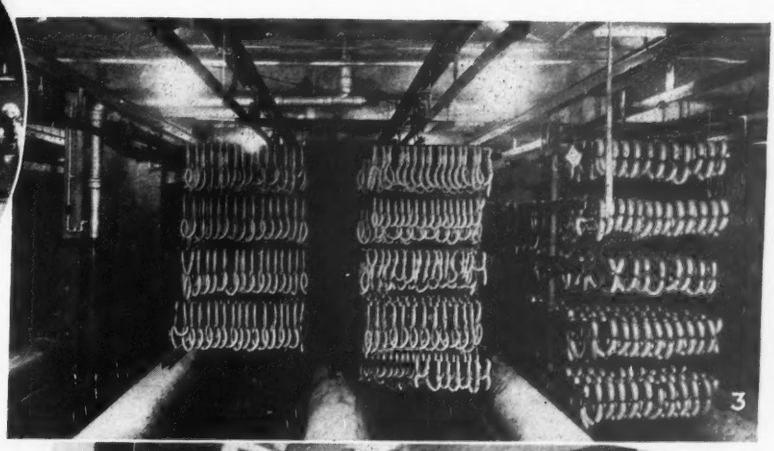
Fig. 2—Traveling electric hoist suspended from I-beam monorail lifts baskets of meat into soaking vats at Morrell plant. It also lifts meat out and conveys it to smokehouses.

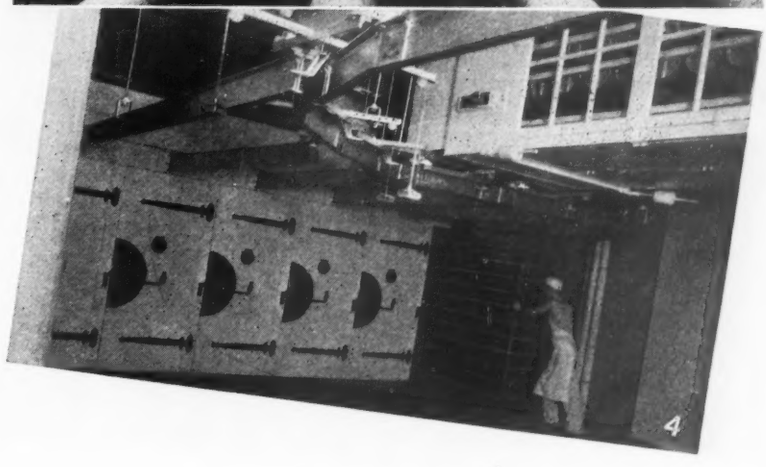
Fig. 3 — Installation of monorails in smoke room of Colonial Provision Co., Boston.

Fig. 4—Bakers use monorails effectively for conveying dough into proof boxes. They also employ them extensively for transporting dough troughs to fermenting room. Note arrangement of switches in this installation.









the light beam. It is also necessary that the carcasses, after eviscerating, be reassembled in their previous order. And to accomplish this, the two viscera tables are operated at exactly the same speed. If one table lags, an auxiliary motor automatically cuts in and speeds it up until it is in step with the other. If one table stops, the other stops, also. As a result of this control, the carcasses line up properly on the overhead conveyor as they leave the tables.

A particularly interesting combination of the chain and monorail conveyors is found in the meat thawing room of a Chicago sausage and canning factory (Fig. 5). This thawing room is maintained at a temperature of 140 to 150 deg. F., with the air circulating rapidly. To bring the temperature of the frozen slabs of meat to 36 deg., so that they may be processed, the material must remain in the room 45 minutes. So the room is equipped with 249 ft. of overhead conveyor, the speed of which is regulated to require 45 minutes for the circuit. Meat is loaded onto a rack suspended from a monorail outside the thawing room. Then the rack is pushed through a swinging door into the room. There a chain driven by 3-hp. motor engages the trolley and moves the rack the length of the room and back twice. At the discharge point, the chain disengages the trolley and the rack is pulled from the room by hand. A safety switch stops the chain conveyor in event the rack is not removed quickly enough to prevent a collision with the one following it. After being emptied and reloaded, the rack is pushed into the room to make the circuit again. Several racks are kept in operation.

The overhead chain-trolley conveyor does not necessarily carry the material being handled. Instead, it may tow a truck on which the material is loaded. Such a system is installed in the warehouse of the Great Atlantic & Pacific Tea Co. in Flint, Mich., with considerable reduction in costs (Fig. 6).

This conveyor consists of a chain suspended from trolleys moving on an I beam. It passes up and down the warehouse alongside stacks of stock. Empty trucks attached to the conveyor at the shipping dock travel directly to the receiving platform. There, the receiving gang removes as many as required to carry the inbound merchandise, loads them and attaches them to the conveyor. When the merchandise reaches the proper point in the warehouse, the trucks are removed by piling crews which stack the material among the active or the reserve stocks. Should the merchandise remain connected to the chain, it will come around again as the conveyor completes its circuit. And there will be no confusion, because all the material moves in the same direction with this system.

Outgoing material is handled just as efficiently. A stock clerk with an order sheet walks alongside an empty truck attached to the conveyor. He picks the necessary merchandise from piles of active stock and puts it on the truck. If a large quantity is required at any point, he detaches the truck momentarily and pulls it to one side. When the order has been completed, the clerk marks the order number on the front of the load and permits the truck to travel unattended to the shipping dock.

A 40 per cent saving in warehouse labor has been credited to this system, along with greater accuracy in filling orders. The cost of operating the conveyor, which is driven by a 5-hp. motor, is said to be much less than the cost of one man's time. The conveyor will pull 20 to 30 trucks at one time. It requires no operator, since it moves continuously.

Royal Baking Power Co., New York, employs an interesting overhead conveyor for bulk material. This consists of a car which travels on a two-rail track over a row of bins (Fig. 7). The car, which has a capacity of 31 cu.ft., operates like a self-help elevator. A trip is set at the starting point and the car automatically stops over the proper bin. The machine is equipped with a scale.

The foregoing applications of overhead conveyors are only a few examples taken from their many uses in the food field. But these demonstrate what can be done with this type of materials handling equipment.

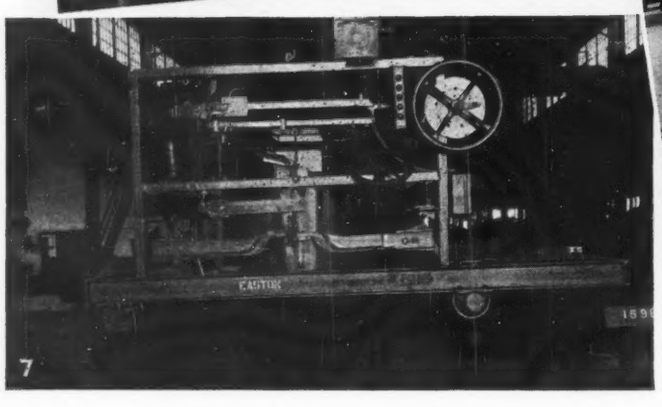


Fig. 5—Combination monorail and chain conveyor in thawing room of meat plant. Chain pushes trolleys along rail.

Fig. 6—Chain-trolley conveyor is used in A & P warehouse to pull trucks loaded with merchandise.

Fig. 7—Royal Baking Powder Co. uses weigh-car, operating on two rails, to transport bulk material to bins. Car automatically stops over proper bin.

Warehouse Handling

Modern Equipment Gives Speed and Low Cost

▶ ***Hand trucks, power trucks, tractors and trailers, continuous conveyors and overhead rail conveyors, when suitably applied, provide efficient movement of materials to and from storage for***

All Food Manufacturing Industries

By MATTHEW W. POTTS
Materials Handling Engineer, New York, N. Y.

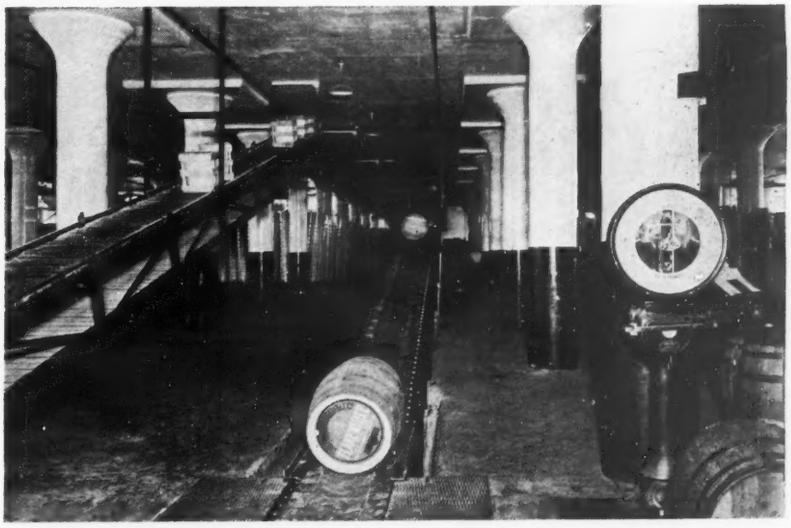


Fig. 1—After filling and weighing, barrels are carried to warehouse on apron conveyor. Crates containing cans of same product go to warehouse on flat wood apron conveyor. Both conveyors incline to ceiling. They are part of elaborate system in which different conveyors are used for different products.

ONE WAY to reduce manufacturing costs is to use efficient methods of handling materials in the warehouse. Many methods are available.

Continuous conveyors for handling practically every type of product and container can be obtained for either horizontal, vertical or inclined travel. These include tray-type elevators, roller conveyors, chain conveyors, belt conveyors, steel and wood-apron conveyors, overhead trolleys and special equipment designed for particular operations.

The use of some form of continuous conveyor will greatly reduce handling costs where large quantities of standard containers are to be handled in the warehouse and shipping department. Such an installation is shown in Fig. 1.

There, barrels, after being filled and weighed, are rolled onto a concave apron or slat conveyor. This inclines up to the ceiling and transports the barrels to the warehouse. At the same time, cans of the same product are weighed at another point and put into crates. These crates are then placed on a flat, wood-apron conveyor which carries them to the warehouse. This conveyor also inclines to the ceiling.

By placing continuous conveyors near the ceiling, aisles can be eliminated and savings made in storage floor space. Such an arrangement also does away with cross-overs by which people get by conveyors on the floor. One large distillery is using an overhead chain trolley conveyor. This was proven efficient for unloading cartons of bottles from cars, distributing them into the warehouse and later carrying them to the filling machines. This type of conveyor operates on an I-beam track suspended from the ceiling. Trolleys hung from the beam are connected by a continuous chain, and a carrier is suspended from each trolley for supporting the load.

In plants where the haul is long, the tractor-trailer system of handling materials has many advantages. Gasoline, electric and gasoline-electric tractors are available. And trailers can be obtained in a wide variety of types, such as the caster, fifth-wheel steer and four-wheel steer reversible. Even hand-lift trucks can be arranged in trailer trains if desired.

One of the latest developments in the tractor-trailer field is the use of pneumatic tires. These eliminate noise and vibration, reduce floor wear and increase the speed at which the trains can travel.

In many plant warehouses, the most efficient method of handling materials is with four-wheel platform trucks, two-wheel stevedore trucks, lift jack handle trucks, or hand-lift-trucks and skids. And when such equipment is used, it is well to consider the advantages of anti-friction bearings in the wheels. Solid-rubber or pneumatic-tired wheels to reduce floor maintenance costs also offer advantages.

Hand trucks can be employed in many manufacturing operations as well as in warehouses, and a number of special types are available. Some have been designed with hoppers which become portable storage bins that can easily be moved to the next step in the process. Then there are rack trucks, shelf trucks and tank

trucks. In some cases the trucks are designed as containers for storage, and also for transportation between plant and consumer, so as to prevent contamination and pilferage.

Frequently, it will be of advantage to use one or more types of materials handling equipment in moving a given commodity through the receiving, storing and warehousing operations. Such an installation is shown in Fig. 2.

In this case, bagged material is unloaded from cars some distance from the storage area. Because of the length of travel involved, it was found advisable to install a belt conveyor system for unloading and transporting the material and for distributing it through the warehouse. As may be seen in the illustration, one conveyor enters the warehouse and automatically discharges by means of a chute to a distributing belt conveyor. Deflectors can be set along the latter belt to discharge the material into a portable chute leading to the floor. And here another system of handling enters.

Fig. 2—Belt conveyor transports bagged material from cars to warehouse. Second belt conveyor distributes bags through warehouse, discharging into portable chute. At end of chute, bags are placed on skids and carried to point of storage with lift trucks.

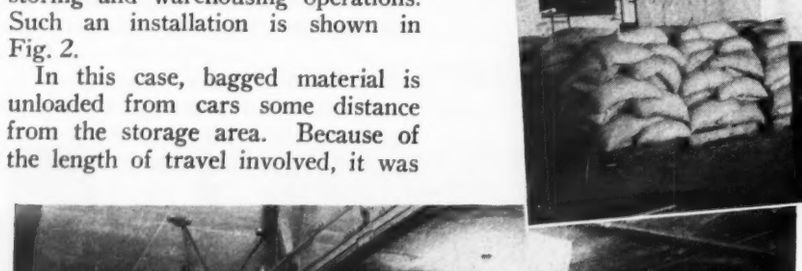


Fig. 3—Electric lift trucks move merchandise from cars to storage areas in large grocery warehouse. Other trucks transfer goods from storage to order assembly room. Electric tram-rail system is used in making up orders for stores.

At the end of the chute, the bags are placed on lift-truck skids, so that there is only one handling operation in piling, storing and reclaiming the material. Either hand-lift trucks or electric trucks can be used for distributing the skids to the storage area.

In the warehouse of the distributor who handles a large tonnage every day, a coordinated system of handling the material is necessary. One of the world's largest grocery warehouses has to receive a wide variety of commodities from various manufacturers. And in turn, it distributes to approximately 2,500 stores located over a wide area. This warehouse has been arranged in such a way that the material all flows in one direction. And with proper coordination and equipment, a daily flow of 400 tons of goods from railroad cars and 250 tons from motor trucks is handled at low cost.

A fleet of electric lift trucks, of the type shown in Fig. 3, is assigned to the task of moving all incoming freight from railroad cars to the storage area. Another fleet carries the goods from storage to the order assembly room and replaces empty skids with full ones. These skids are loaded with a single item and are numbered consecutively. This cuts the time consumed in filling orders. Aisles are exceptionally wide and electric elevators are properly placed so that the electric trucks are not delayed in floor-to-floor movements.

Handling of orders for shipment to the various stores is done with an electric tram-rail system. This moves in trains, the cars being platform hand trucks suspended from an overhead rail by specially designed carriers. As the cars move along the aisles, stock for several stores is put on them, the items for each store being kept separate. When the train reaches the truck loading platform, the hand trucks are quickly removed from the carriers. Then the load is transferred directly to motor trucks for delivery. Certain items, such as flour, sugar and potatoes, are hauled by an electric tractor-trailer system to the loading dock.

Overall transportation costs in this warehouse have been reduced by 25 to 30 per cent by this efficient handling system, it is estimated. Besides, there are savings as a result of quicker truck unloading and loading, which reduces truck waiting time.

To perform certain materials handling operations in a given industry, it is frequently necessary to design special equipment. This is true in the case of hand trucks, lift trucks, platform trucks, skids, conveyors, overhead cranes, hoists and monorails, all

of which are now being used throughout the food industries. Manufacturers of materials handling apparatus have developed much special equipment, both on their own initiative and in cooperation with engineers in the industry. While the equipment is designed primarily for a given operation, it frequently can be adapted to operations of a different nature in other plants. A typical example is shown in Figs. 4 and 5, where the same principle of handling is employed by different truck manufacturers and in different industries.

The truck shown in Fig. 4 is what is known as a fork truck. It handles pallets, or wooden platforms, with 50 bags of walnuts to a load. Its load weighs approximately 5,000 lb. and towers 12 ft. in height. The truck is used in the storage area of the new central warehouse of California Walnut Growers' Association. This warehouse covers approximately seven acres. To eliminate rehandling and reduce the number of truck trips, the walnuts are stacked up at the car door, 25 sacks at a time, on wooden pallets. Then the truck tiers one pallet on top of the other and carries the load to the blending tables or deposits them in storage space.

It takes only one man to handle these huge loads. And with two men building up pallet loads at the car door, a great amount of work is done in a hurry. So efficient is the method that it has contributed in large part to an estimated saving of $400,000 in warehouse operations.

In some of the large canning operations on fruits and vegetables in California, and perhaps elsewhere, the standard method is to use trays for handling cans coming from the cookers. For many years it was the practice to make up a stack of about twelve of the trays and then pick them up with a fork-type, two-wheel, stevedore hand truck. This truck had high standards against which the trays would rest while being transported from point to point.

But since the process of cooling the cans takes anywhere from 4 to 24 hours, there was opportunity to improve efficiency in the larger plants by a quick method of handling. So after some experimenting, the gasoline-electric truck shown in Fig. 5 was developed for one plant.

This truck picks up the same cooker trays, but it is able to handle from one to six times as many piles at a time. And the piles are higher. Moreover, the truck moves the material three or four times as fast as the hand trucker normally moved this load—five times as fast in the case of the new gasoline-electric truck.

After this special truck was developed to handle cooker trays, it was applied to the transportation of cases and cartons of canned goods. And it was also used to carry boxes of incoming fruits and vegetables.

In many smaller canneries, wooden or fiber cases of the finished products are efficiently moved from the warehouse to freight trucks by power trucks. Especially is this true where the distance from the warehouse to the loading dock is comparatively long.

There is hardly a commodity or container that cannot be successfully handled through warehousing, shipping and storage by some form of standard or special materials handling equipment. But when contemplating the installation of this equipment, all factors should be considered. And the following steps should be taken to determine the advisability of purchasing the equipment:

1. Consider the physical layout and determine whether it is advisable to install mechanical methods.
2. Make a careful analysis of present operating costs, as well as of the kinds and quantities of commodities handled.
3. Select the best type of equipment for the particular installation.
4. In considering the savings to be effected, be sure to include the safety factor, reduced fatigue to operating men, increased speed of handling and elimination of accidents.
5. Remember that all mechanical handling equipment requires maintenance. And be sure to include the cost of power, whether it be gasoline, electricity or steam.

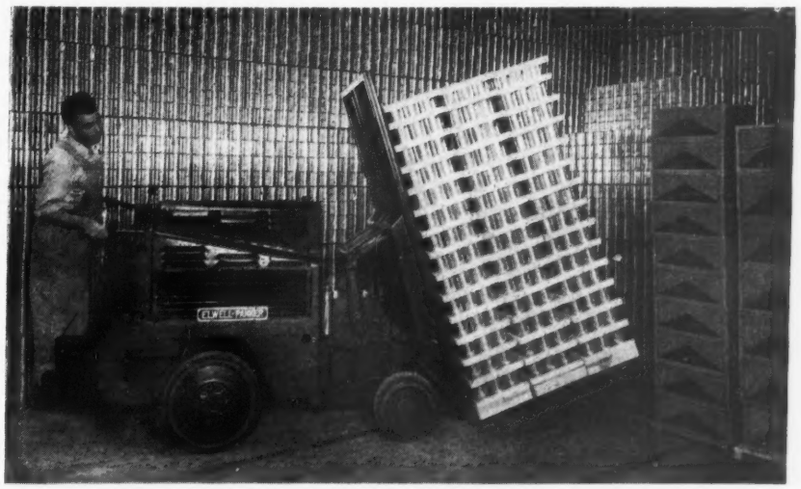


Fig. 5—Gasoline-electric truck handles cooker trays, cases and cartons of canned goods. It operates three or four times as fast as hand truck formerly used and carries six times as many piles. The piles are higher, too.

Fig. 4—Fork truck handles two pallets loaded with 50 bags of walnuts. Truck picks up load at car, tiering one pallet on top of other and lifting both.

Loading and Unloading Systems

Careful Coordination Cuts Distributing Costs

By JOHN H. EARLE
International Harvester Company
New York Branch

IT is only during the last few years that the majority of companies that process and market standardized food products have realized the importance of their delivery costs to their net profit or loss. The selling price of standardized processed food products tends to become uniform throughout the country. The manufacturer's cost for his raw material and his processing cost per unit have become standardized for the same kind, quality and size of product. The largest profit or loss difference of two competing processing companies dealing in the same standardized food products lies therefore in their cost to sell. With these companies "Delivery Cost" is the most important factor in their "Cost to Sell." Methods of loading and unloading these products for delivery to retail stores and consumers is an important part of the delivery or sales costs and a part of the loading and unloading problem is the movement of the goods from the last processing operation to the delivery vehicle, or to temporary storage and then to the delivery vehicle.

This article deals only in a general way with the highlights of the methods of loading and unloading this type of product. Each different company or branch house of the same company has individual problems. Therefore a specialized study is necessary to solve the loading and unloading problem to the best advantage. There are, however, broad general principles involved which should be thoroughly understood and correlated with the new mechanical loading devices in order to improve present methods.

The method of placement of a product in a delivery vehicle is determined by the unloading of the product. Therefore, in the following outline, we first divide the subject into single or multiple stop deliveries. Other divisions are also determining factors in the methods of loading and unloading. These, in turn determine the methods of moving the goods from last processing operations to delivery units. Diagram I shows the division between single and multiple stop deliveries.

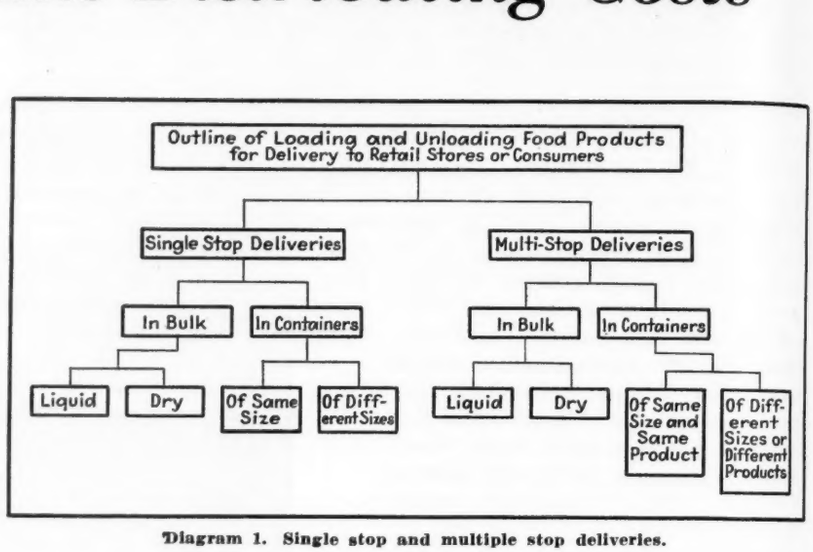


Diagram 1. Single stop and multiple stop deliveries.

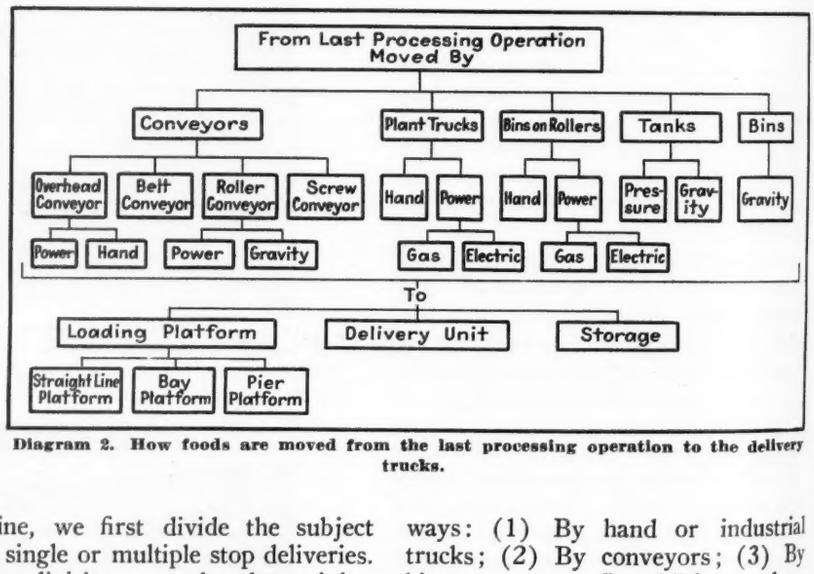


Diagram 2. How foods are moved from the last processing operation to the delivery trucks.

The finished products are moved to the delivery vehicle and loaded either directly from the last processing operation or from temporary storage. The goods in containers are moved for loading in one of three principal ways: (1) By hand or industrial trucks; (2) By conveyors; (3) By bins on casters. In addition to these three ways, bulk goods are sometimes loaded by gravity or pressure from storage or bins. This is shown more clearly in Diagram II.

It is not possible to discuss here in detail all the different methods of moving goods from their final processing operations to the delivery unit. Therefore, we omit any discussion of loading goods for single stop delivery or of moving goods in bulk for multi-stop operation. The discussion is confined to concrete problems dealing

with container goods for delivery to retail stores and consumers. Diagram III is a further subdvision showing specific examples of multi-stop deliveries of foods in containers.

In instances where the manufacturer processes and sells a single product such as bottled beer in cases, bread or cake of one or two kinds only, or similar products, rear vehicle loading is the general method. Therefore, the trucks are backed up to a straight line or bay type loading platform and the goods are loaded into the vehicle without any necessity of sorting.

Money is expended every time goods are handled. Therefore, it is always advisable to move goods direct from the last processing operation to the delivery platform where such a course is possible. A study of each individual case is generally necessary to accomplish this kind of loading. Most plants have grown by stages and space is generally at a premium, with delivery platforms often forming a bottle neck to the whole operation. Where large delivery fleets are used, it is sometimes possible to increase the efficiency of loading by the use of side door operations. Figs. 1 and 2 illustrate this method. Fig. 1 shows the problem solved with a narrow deep bay loading space, and Fig. 2 with a long shallow bay.

The success of both of these types of revised loading methods depends on the rapid and uninterrupted movement of the finished product to the loading platform.

If this movement is slow or is of an interrupted character, then both of these types of loading break down. It is then better to use the deep bay without piers or side door loading, and the long narrow platform should be used for rear door loading operation as in the original method. This is so because in both instances more trucks can be placed against the platform for rear door loading than with side door loading, and the idle truck time consumed while waiting for goods to come to them would not work as a great hardship because when the goods do arrive they could be loaded faster into the greater number of trucks. Where the movements of goods is rapid and uninterrupted, the loss of time because of placement of truck to platform is cancelled by the constant moving truck line along the long narrow bay. In the pier type, the goods can be loaded from the rear and both sides at one time, which of course saves considerable loading time and expense.

The problems involved in unloading empty cases and returned goods onto the unloading platform are identical in principle with the loading problems outlined above. The distance the finshed goods are moved from the last finishing operation to the loading platform, whether by conveyor, truck or bin, should be the shortest distance possible. Storage space for finished goods should be eliminated as much as possible. But where storage space is necessary this space should be located as near the loading platform as possible.

The most efficient mover of goods of the class here under discussion is generally the conveyor. This can be the belt, roller or overhead chain type. Its speed should be closely synchronized with plant production and loading platform facilities.

The loading problem becomes more complex when the delivery units are of various sizes or of different products. The retail milk route of today is an excellent example of a single type of product which has become multiple in kind. Milk is now delivered in pints and quarts, and in different grades, together with cream in different size bottles and in different grades. The average New York retail milk route will have nineteen different kinds of milk containers, as well as eggs, butter, cheese and other products. The ideal loading method for this type of products is a gravity roller conveyor for the cases from the bottling machines to a long platform which has a loading station for each type of product. Fig. 3 shows this idea in detail.

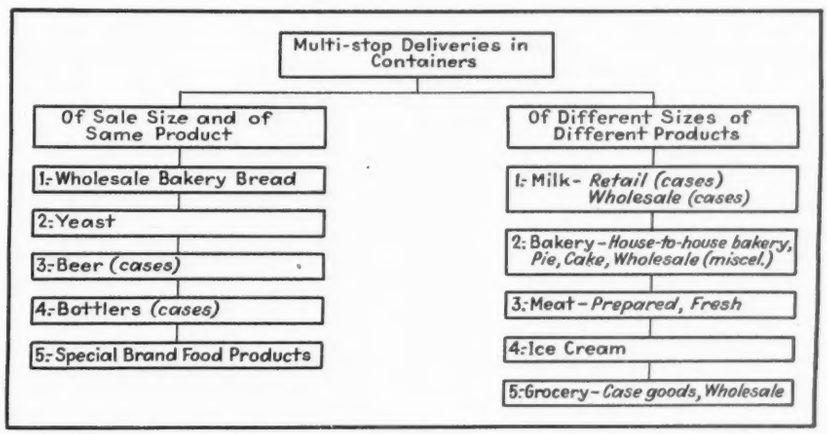


Diagram 3. Types of containers handled in multi-stop deliveries.

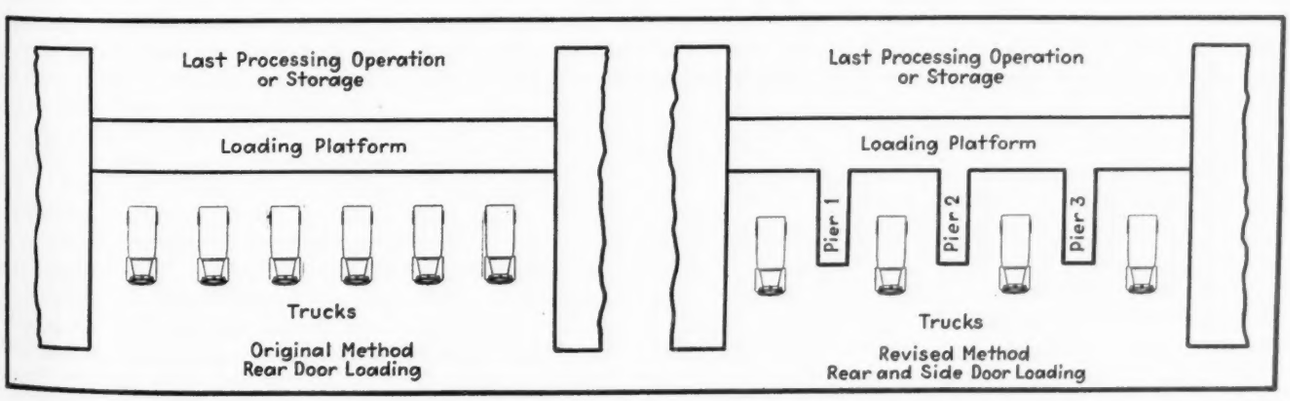


Fig. 1. How a deep loading bay can be adapted to side door loading.

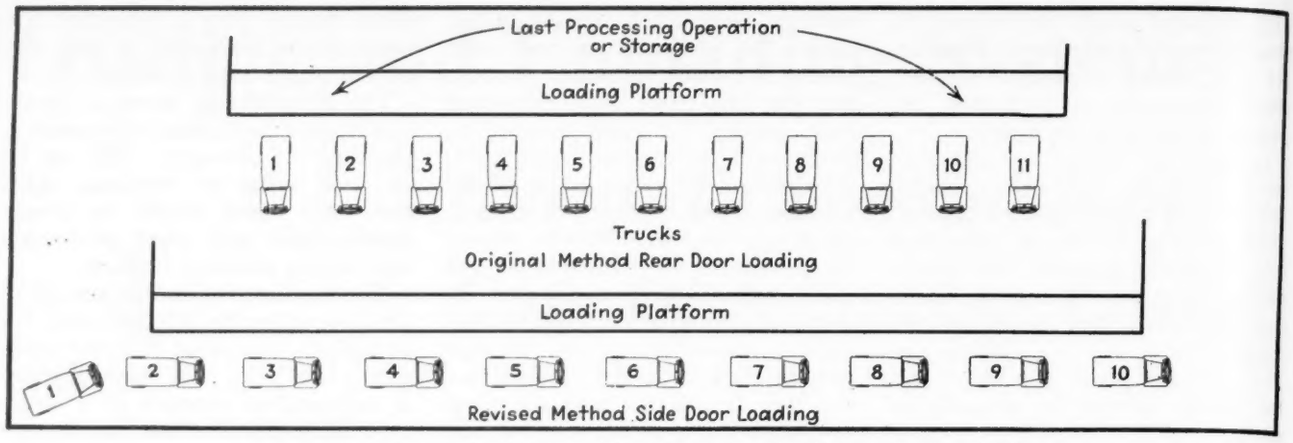


Fig. 2. How a narrow, but long, loading bay can be adapted to side door loading.

This same method can be used to advantage with wholesale fleets, when the wholesale routes carry many kinds of sizes and grades of milk. It is obvious that this method is not of such great advantage over rear door loading if the routes carry only a few different sizes and grades of milk and dairy products.

Loading house-to-house bakery trucks has been solved by the use of racks or bins on casters. These racks are built to hold the various trays which fit into the truck rack. Each route truck has its own plant rack on casters. This is filled with the route man's order for that day. The pies, cakes, rolls, etc., are packed into the trays and placed in the plant rack as it is moved from one finished goods station to the next. Truck loading time is thus reduced to a minimum.

The trucks arrive at their loading platforms in rotation, the loaded plant rack is wheeled into position and the trays are transferred from it to the truck rack. One house-to-house bakery using this method loads 300 trucks from one loading platform in one hour.

Rear door loading is employed for this method. Loading platforms differ in shape—some use the shallow bay with the long narrow platform and others use the deep bay with the platform running along three sides. The last type requires considerable planning to keep truck lanes free of traffic.

A study of this system could profitably be made by any plant which manufactures diversified goods for retail distribution.

Pie and cake bakers also transport their loads in racks built into each side of the delivery truck bodies with an aisle between. The rear door loading method is employed. Various systems are used in moving the finished product from the ovens to the delivery platform, the modern method being similar to the house-to-house baking system in that pie or cake trays are used in plant racks on casters. These trays fit into the truck compartments. The load for each truck is sorted and loaded into the trays in the plant.

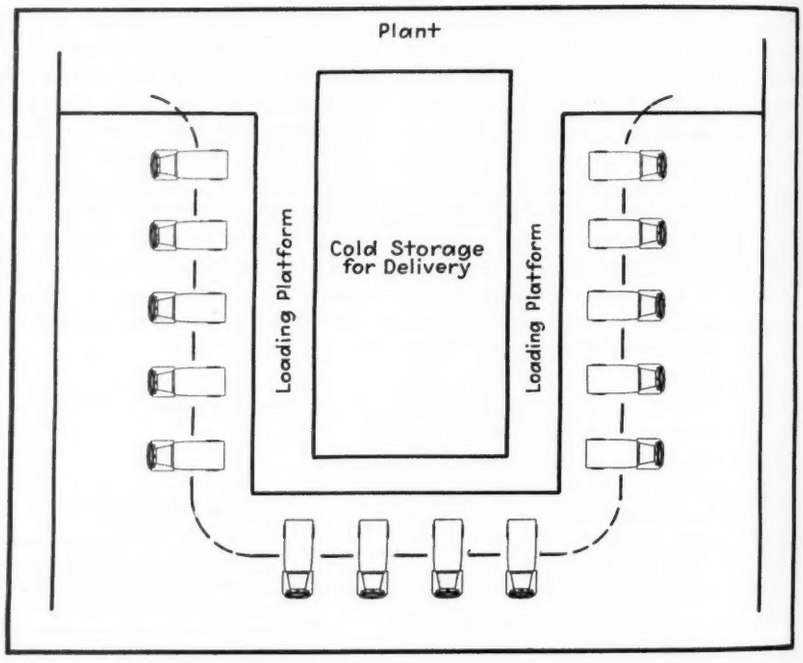


Fig. 4. Arrangement of deep bay loading suitable for use in the delivery of fresh meats.

Wholesale bread bakers who process a diversified line of bread and rolls have a more complicated loading and delivery problem than the baker who specializes in one or two brands. The general practice of the diversified manufacturer is to load from wrapping machines into large bread baskets which are then loaded into trucks by the rear door method. Each route man's order for the day is checked off at the wrapping machines as it is loaded into the basket. The trucks are loaded in rotation. By this method a large number of trucks can be loaded in a short time.

Problems of plant transportation of prepared meats either in packages or containers for movement to the delivery platform are similar to the problems already discussed. The loading problem and the loading platform design is also similar to those which have been discussed. The handling of fresh meats presents a new problem because of the necessity of refrigeration. The refrigerated storage space should be located as near the loading platform as possible and the meats should be moved from this storage into the delivery trucks with the least possible delay.

The refrigerated body of the truck should be properly chilled when it is brought to its platform and the door opening time should be kept to a minimum. To do this successfully a careful planning of the loading platform is required, together with perfect synchronization between the spotting of the truck and the arrival of its load. There is no excuse for the common sight of piles of fresh meat on hand trucks waiting on loading platforms for trucks to arrive or be spotted. The plant routing superintendent should see that the load for each truck for the day is brought up to the loading platform in its proper order as to both the spotting of the truck and the order of its loading for delivery. Therefore, the route man should lay out his day's order in the reverse order of unloading, as nearly as he can determine it. And the goods should be delivered to his truck in this order. Fresh meat loading platforms and loading bays should also be large enough to avoid traffic congestion delays. The same platform should also be used for the unloading and removal to cold storage of the day's return goods. Fig. 4 shows an ideal loading platform, bay and cold storage room for this type of loading. If hand trucks are used, the load for the delivery truck can be assembled inside of the cold storage space and rolled to its position and loaded with a minimum amount of time for moving, sorting, or loading in warm air.

The method of handling fresh meat for loading and unloading provides an excellent example of the method for use with ice cream for delivery to soda fountains and retail stores. The same refrigeration problem is involved, with the necessity for large loading bays and platforms, and for rapid movement of the ice cream containers from one cold storage space to the cold refrigerated delivery body.

Wholesale grocers have a different problem because of the large number of different articles which they carry. These goods are generally delivered on order only, so that the day's route and load is determined and assembled the day before delivery. In order to save as much time as possible on the route, each store's order should be placed and kept together as a unit in the truck body until delivery. If the goods are placed in the truck as to their kind, a large amount of time is lost on the route from the driver having to sort out each customer's order in a small and congested space. Therefore, each store's order should be segregated as it arrives so that delivery to the route truck may be made in the proper order of unloading and in single store units. This requires considerable space back of the loading platform, but it is space that pays for itself many times over. The movable bin system meets the requirements well. Fig. 5 shows the arrangement of the bins and the movement of goods to the loading platform.

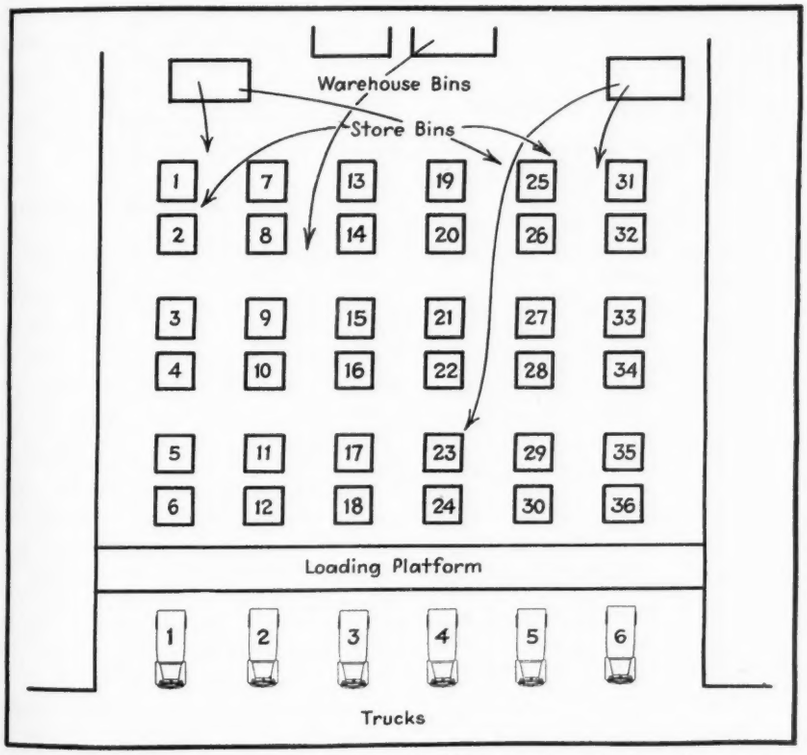


Fig. 5. Arrangement of storage bins, movable bins, loading platform, and rear door loading trucks suitable for the operations of a wholesale grocer.

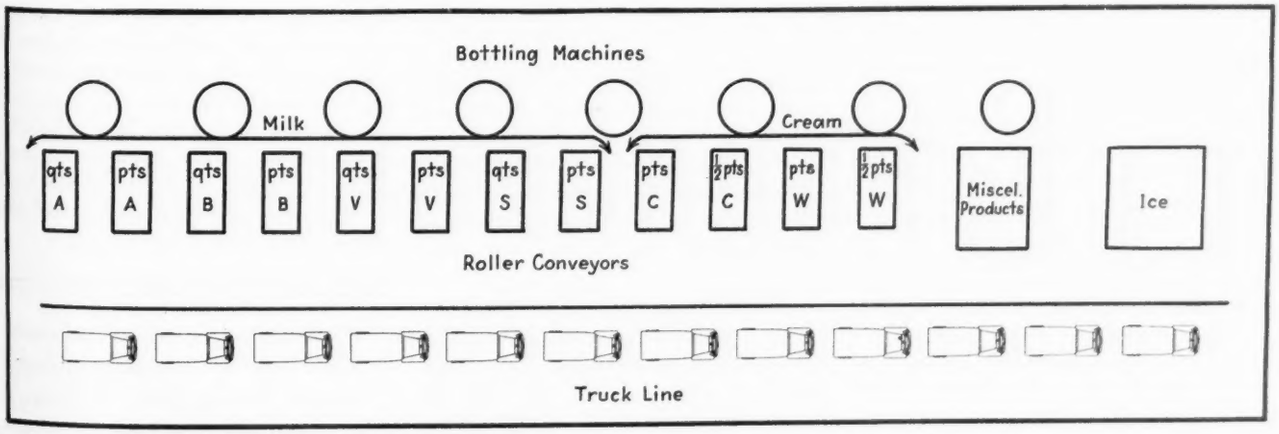


Fig. 3. Arrangement of loading platform with relation to bottling equipment and other product storage in a dairy.

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The Way to More Pay

EVERYBODY is interested in making more money.

Every foreman, today, wants to know how to make more money. He would not be human if he didn't. Probably he lies awake nights wondering when he is going to make more.

And every superintendent also wants to make more money—and have less grief. Every superintendent that we have ever known would like to see his foremen worth a lot more to the company, so that he could put through a pay raise for them.

The trouble is that most foremen never give the superintendent a good chance to boost the pay check. If a superintendent tells the factory manager he wants to give Bill Johnson a few dollars a week extra, the first thing the manager is going to say is, "What for?"

What is going to be the answer? Will he say, "Bill has five kids and expects another next month."—Is that a *reason* for a pay raise?

Or should he say, "Bill has had a lot of hard luck lately. His wife's mother lives with him and the old lady is sick all the time. Big doctor bills." That's no *reason* for a pay increase, even though Bill needs the money.

But suppose he says, "Bill figured out a way to fix that conveyor where it goes through the wall into Building 2—you remember where it makes the turn on the other side—and we haven't had a delay for two months. It used to choke up about every five days and it is so high up we had to build a ladder on the wall so that a fellow could get up there before the whole plant would have to stop working. You know how it used to spill goods all over the place. I figure that Bill has saved us about $25 every month and he ought to be getting part of it."

That is a real *reason* for a pay raise. And even if the plant manager might want to wait for a couple more months, just to see if it is as good a saving as the superintendent thinks it is, the foreman has given the superintendent a mighty good reason for putting up a fight for Bill, right now.

You Can't Push a Chain?

WHILE we are on the general subject of materials handling, let's give a little thought to mean conveyor drives. It's a job that everyone, from a foreman up, has to figure out at one time or another.

Most conveyor drives are fairly easy to plan. Everybody knows that the right way to do the job is to put the power drive on the head end of a belt conveyor—never on the tail. And, of course, the head end is the end toward which the material moves. In this way the load is pulled most easily.

Difficulties of Tail End Drives

If the drive is from the tail end, the pull on the belt and head-pulley bearings is about double what it would be if the drive is on the head end. The slower it moves the worse it is. And, when the load is going uphill, the pull is still greater. That makes it necessary to have bigger bearings on the head pulleys. It also puts a bigger stress on the conveyor frame and necessitates a stronger frame. Yet, if you have ever worked in a small plant where you do everything yourself because there isn't any mechanical engineering department to do it for you, you have probably run into this kind of a problem. There are some jobs where you can't get away from it.

For Projecting Conveyors

Take the case of a conveyor which is to project out into open space. Perhaps it is a waste conveyor that will project about 15 to 20 ft. out over a pile or a bin. Many times there is no way to mount a motor at the head end without going to a lot of bother and a bigger lot of expense. If the drive could be from the tail end, it would be fairly simple.

But any old timer, whether he be a machinist, a mechanic or plain handyman will tell you that you can't push a chain. Well, you can't push a belt either. Yet there is a way to get around it. It is possible to drive small short conveyors from the tail end and get away with it. About 30 to 40 ft. seems to be the practical limit of conveyor including the part which does not project beyond the supports.

You can move a lot of material in two ways. You can move it slowly in big batches or rapidly in small batches. One case takes a big conveyor running slowly; the other takes a small one running fast. Both can take about the same length of time and both will take about the same amount of power to do the job.

Slow Speeds Increase Problems

When it comes to designing such a projecting conveyor, however, there are quite a lot of important differences. The slow one needs heavy frames, heavy pulleys, heavy belt or chains. And also a considerable reduction of speed from motor to the drive pulley which, in this case is to be on the tail end—the wrong end.

The idea is to make the conveyor chain or belt run as fast as practical, say 50 to 100 ft. per minute, and thereby cut down the amount of material in the conveyor at any one instant. This will reduce the amount of pull exerted by the weight of the load on the head pulley. Then it is important to make the head pulley extra large in diameter. Make it about twice as large as you would use if you were driving the head end.

To go into all the necessary calculations in so short a discussion is impossible. So all that can be said here is that if you have to do the job the wrong way, if you have to drive a conveyor from the tail end, then run it fast and use a large diameter head pulley. Also be sure to have ample take-ups to take the slack out of the belt or chain and check this point every dav.

EVERY reader of FOOD INDUSTRIES is urged to comment on subjects discussed in these pages. If you have any ideas, let's have them.

ANSWERS TO PLANT QUESTIONS

This Month's Question

What practice do you follow in the care of your thermometers, temperature recorders, and similar precision instruments to avoid breakage, and to assure cleanliness and accuracy?

Depends Upon Laboratory Testing and Engineer Inspection

ONLY thermometers from manufacturers of proved reliability are purchased for retort work. These are taken from retorts at regular intervals, the thermometer pockets are inspected and cleaned, and the thermometers are tested against a standard thermometer over the range of temperatures for which they are to be used.

For jam boiling, new or repaired thermometers are tested by the laboratory before use. The thermometers are kept in a special rack in the laboratory, inspected daily for cleanliness and checked at regular intervals against a standard thermometer.

Temperature recorders and controllers are mounted on panels so that they are protected as much as possible from damage by possible mishandling. They are inspected and cleaned regularly by a member of the engineering staff, who is responsible for their operating condition. A member of the laboratory staff checks temperature recorder charts daily with temperatures shown by indicating thermometers. Any existing discrepancies are investigated and corrected promptly. Recorder charts are changed only by responsible members of the factory staff.

All employees coming in contact with thermometers, recorders, temperature controllers and other precision instruments are trained to regard them as delicate pieces of equipment to be handled with care and to be adjusted only by members of the staff specially assigned for that particular service.—B. W. CLARKE, *Crosse & Blackwell Co., Baltimore, Md.*

Employs a Visiting Plant Inspector

EACH of our milk plants has one employee whose duties include a thorough daily inspection of all equipment, including thermometers, after cleaning up. His work is in turn checked by a visiting factory inspector every month or six weeks.

Most process equipment carries two thermometers; one straight stem and one recorder. If these do not check, investigation is made. Thermometers are checked periodically; usually by the laboratory man and also by the traveling factory inspector on his visits. Checking is done by immersing the thermometers to the usual depth in water at the temperature for which they are used. Accurate laboratory thermometers are used as checks. For temperature above boiling we use either a pilot sterilizer or a short piece of 6-in. pipe capped at both ends, connected to a steam line, and fitted with several threaded connections.—F. L. SEYMOUR-JONES, *Borden Company, New York, N. Y.*

Reduces Breakage by Safety Glass and Tell-Tale Tags

THERMOMETERS used in the baking industry through necessity must be accurate and rugged in construction. Should a thermometer become broken it immediately is a foreign substance hazard. Our policy has been to replace all glass covers with non-shatterable safety glass, which when cracked or broken seldom splinters and flies about.

General utility thermometers are used for atmospheric and ordinary room temperatures. They are usually hung on columns or in some protected location.

Handled thermometers, for dough testing, quite frequently become damaged. Usually the damage is caused by carelessness of the operator. To avoid forgetfulness, a steel chain about 18 in. long is attached to the ring of the handle of the thermometer and a $2\frac{1}{2}$x$2\frac{1}{2}$x$\frac{1}{16}$-in. metal plate is attached to the other end of the chain as a tell-tale tag. This tag is usually painted red. When the thermometer is inserted into the dough, the tag is placed over the side of the trough or mixer bowl. The tag catches the operator's eye and the thermometer is removed before the dough is sent to the divider or before the mixer is started. When not in use these thermometers are hung on a substantial hook in a protected place.

Mercury-actuated recording thermometers and pyrometers (electric thermometers) are checked once a year by a service man representing the manufacturer. At this time these instruments are checked against a master instrument for temperature and are fully serviced. Switches and wiring, however, are checked daily by our plant engineers when making inspections.

All thermometers are dusted and cleaned daily. For washing we use $\frac{1}{2}$ oz. of tri-sodium phosphate per gallon of tepid water, followed by a thorough rinsing with clear water.—HERBERT G. HOFFMAN, *Continental Baking Co., Inc., New York, N. Y.*

Next Question

What system do you follow in doing your repair and maintenance work? Is it done in a continuous manner while plant is in operation or do you shut down periodically and do an overhauling of your equipment?

Additional answers to this question will appear in FOOD INDUSTRIES for November

THE PLANT NOTEBOOK

FIVE DOLLARS WILL BE PAID FOR BRIEF STORIES WHICH ARE SUITABLE FOR USE IN THIS DEPARTMENT. SKETCHES OR PHOTOS SHOULD BE PROVIDED WHENEVER POSSIBLE.

Practical Frozen Egg Testing

IF fresh laid eggs are properly inspected, opened under proper conditions and precautions, and immediately frozen, such eggs compare most favorably with fresh eggs for bakery use.

On the other hand, it may happen that from time to time, a can of frozen eggs will be found which is not entirely satisfactory for one reason or another and the deterioration may be so slight that only after they have been baked into products is the trouble discovered.

To give a fair test to suspected eggs, it is necessary to transport a goodly sample to a laboratory (usually packed in dry ice). Once there, a bacteriological examination and ammonia-nitrogen determination must be made. Both of these tests are time taking, involved and expensive.

A method of testing frozen eggs, right on the spot, requiring only about a minute or two was devised by the writer and has proved to be reliable and eminently practical.

A steel rod about ½ in. in diameter and 10 in. long has one end rounded off and the other end provided with a handle. If this rod is well heated and plunged into solidly frozen eggs, it melts a portion on the way in and when withdrawn has on its surface fried egg and on the top of the fried egg, a certain amount of liquefied hot raw egg.

If the odor arising from this rod is the well known aroma that should come from fresh eggs when fried, the eggs have always been found to be in perfect condition.

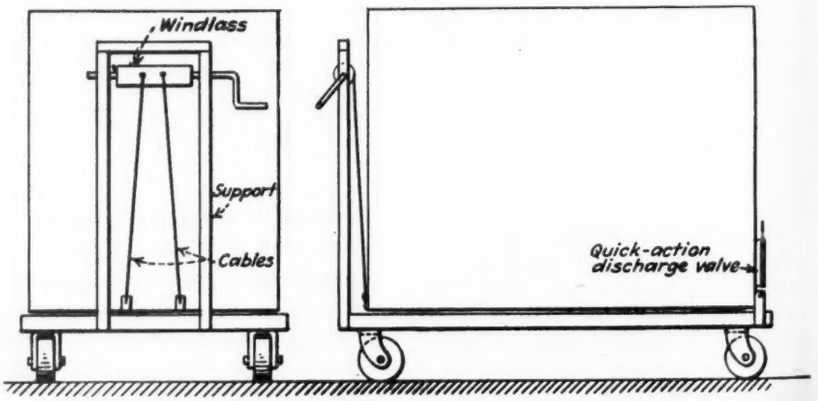
If there is the slightest trace of staleness, mustiness or taint of any kind, it shows up very definitely in the odor of the hot sample.

This procedure has been in use long enough to show that it is a very simple and reliable test of the quality of frozen eggs.

An electrically heated rod, something along the line of a hair curler (without the movable part) works perfectly. — JOSEPH COFFIN, *New York, N. Y.*

Tilting Tank Truck

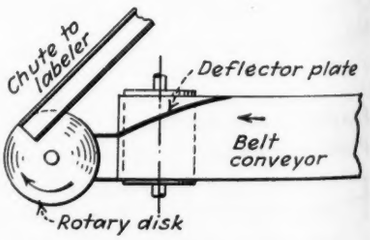
TANK TRUCKS, or portable vats, used in factories for handling fluid and semi-fluid substances sometimes are emptied through a large quick-action valve, or gate, at one end near the bottom. And the complete discharge of the substance is facilitated by raising one end of the tank so as to incline the bottom. Such a method of handling material is employed at the Indianapolis plant of Stokely Bros. Co., where plant mechanics have pivoted the tank at the front support and built a hoist onto the truck at the rear. The hoist is nothing more than a windlass mounted on two uprights bolted to the back of the truck. It is a small-diameter steel cylinder with a crank attached so that it will wind up two cables attached to the tank bottom.



Tilting tank truck equipped with windlass

Can Feeder

FEEDING filled cans to the conveyor which carries them to the labeling machine ordinarily is done by hand. But at the plant of Stokely Bros. Co., Indianapolis, which has installed a high-speed labeler with a capacity of nearly 500 cans a minute, a mechanical feeding device is used. This consists of a metal disk which is about 2½ ft. in diameter and which revolves at about 60 r.p.m. Cans move to this on an ordinary belt conveyor on which they are set in an upright position after being taken from the retort baskets. As the cans move onto the disk they are slid by centrifugal force to the outer circumference so as to form a single line. This line then discharges into a chute which turns the cans on their sides while carrying them to the labeler on the floor below.



Plan of can feeding arrangement for high-speed labeler.

Transfer of the cans from the belt conveyor to the rotating disk is ef-

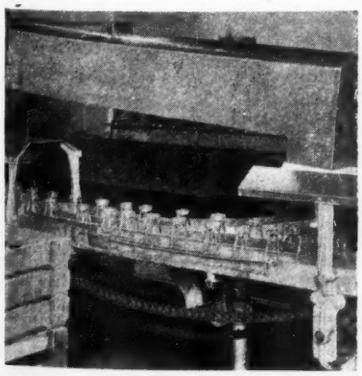
fected with the aid of an intervening "dead" plate. The cans moving on the conveyor push the cans ahead of them across the dead plate and onto the rotating disk. A deflector plate at the end of the conveyor pushes the cans to one side of the belt as they approach the dead plate.

Bottle Inspection Lighting

AN improved lighting method for bottle inspection, developed at the Adohr Creamery, Los Angeles, Calif., has been found to assure clean bottles with a minimum of visual strain for the inspector. From both the inspection and visual standpoints, the installation has been found considerably superior to previous methods.

The principle behind the job is the maintenance of a high level of illumination (90 foot-candles) on the bottles so evenly distributed from the light source above the conveyor that highlights and spectral reflections are avoided. In other words, the operator can examine the bottles inside and out without having bright spots of light and reflected glare thrown back into his eyes from the surfaces of the glass. On the other hand, under this high level of illumination, tiny cracks or foreign particles show up distinctly at any point on or within the bottle.

The light is supplied by a regular 450-watt Cooper-Hewitt mercury vapor lighting unit, mounted within a special aluminum housing parallel to the bottle conveyor. This housing projects down below the edge of the lamp and reflector, protecting the lamp and preventing all direct light from getting into the operator's eyes. Due to the width of the reflector, 10 in., all the bottle surfaces are uniformly illuminated.



Close-up of bottles showing how proper inspection lighting avoids highlights.

Elimination of high lights is due both to the location of the unit and to the fact that mercury vapor tube operates at a low "intrinsic brightness" (a large area of light source in proportion to output). In addition, the mercury light is said to have inherent qualities that make for sharpness of vision in revealing details. Ordinarily, a light level as high as 90 foot-candles shining on glass would create serious visual strain At the Adohr Creamery, the operator carries on this inspection job approximately eight hours per day without experiencing eye fatigue or decreased visual efficiency.—E. S. PATTISON, *Mount Vernon, N. Y.*

Belts Which Slip Off in Starting

ONE thing which can be classed as a distinct nuisance in any plant is a belt that slips from the pulleys on which it is mounted when a motor is started, or when the shifter is used to throw it to the tight pulleys for starting a machine. While there are a number of reasons for this happening, it always comes back to one first principle. There is not enough friction between the belt and the pulley that is turning within the belt to turn the load over, and the belt slides sidewise from the pulley as a result.

In the case of a motor, quite often the motor pulley is quite small in diameter, and the pulley to which the belt runs from the motor is larger, resulting in a small arc of contact on the pulley at the motor. A pulley should be used which have a high fractional value, such as a paper pulley or one of the type that is made of wood and a glue binder under hydraulic pressure. Such pulleys tend to retain the belt much better. Really good belt dressings are a distinct help in this respect, also.

Another expedient is to increase the effective area of belt and pulley which are in contact. This last method may be accomplished in any one of the three ways, by a combination of any two of the three, or by a combination of all three, which are numbered below for clarity.

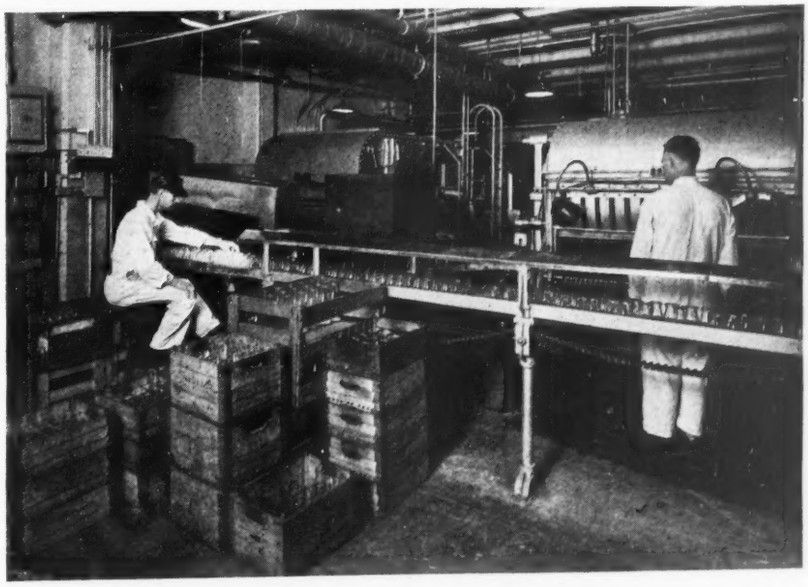
1. Increase the diameter of both pulleys on which the belt runs, so that a greater area of belt and pulley will be in contact.

2. Increase the width of the belt used, if the pulley faces will accommodate a wider belt to advantage. If the pulley faces are at present no wider than the belt, then install wider pulleys in order that a wider belt may be accommodated.

3. Use a wrapper or snubber pulley, or some sort of wrapper pulley drive, in order that the belt may run in contact with a greater arc of each pulley.—JOHN H. HYLER, *Peoria, Ill.*

Don't Skimp on Steam Traps

ONE good way to waste money in the food plant is to try to make one steam trap do work that requires two or more traps. Sometimes the operator thinks that he gets by with this, because on the surface it seems to work out all right. The two appliances that are drained by one trap



General arrangement of lighting for bottle inspection.

will seem to function well. But if the results are analyzed, it becomes apparent that the practice is wasteful—both in steam and time.

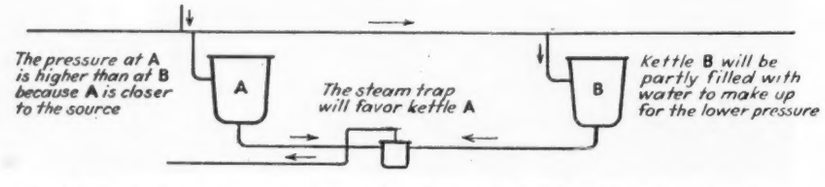
For example, consider the two kettles shown in the accompanying sketch, served by one trap. Since the steam pressure is always lowest at the point farthest from the source, the pressure at kettle *B* must be lower than at kettle *A*. And the steam trap will favor kettle *A* in proportion to its higher pressure.

If the pressure difference is high enough, kettle *B* will become water-bound. Then no cooking can be done in it. But ordinarily, the pressure difference is partly made up for by the hydraulic head of the condensate and the machine functions at reduced efficiency.

One pound of pressure is equivalent to 2½ ft. of water. Thus, if the pressure at *A* is 1 lb. higher than at *B*, and if the distance from the bottom of the kettle *B* to the top of the trap is 1 ft., then kettle *B* will be water bound to the extent of 1½ ft. and its capacity will be reduced in that proportion. Even if the kettles were symmetrically located about the source, that would be no assurance that the pressure at both will be the same, because a difference in pressure might arise from bends, fittings, load variations, or other causes.

Apart from the difference in pressure at the two kettles, there is another reason why each unit must have its own trap. Immediately after steam is turned on in a unit, its condensate is colder than the condensate of a machine on which the steam was already turned on. If both of these units are served by a single trap, the colder condensate will not flow to it until the two temperatures are equalized. This is because the hotter condensate has a higher pressure.

The theory of this can be verified in actual practice, if a record is kept of the performance of the units before and after an alteration in trapping is made. In one plant some 60 traps were added so that each steam-using appliance could have its own trap. The total cost of this change was about $700, and it was estimated that the resulting saving during the first year was more than twice that amount. Another concern was able to increase the capacity of its cooking units by 35 per cent through such a change in its trap equipment.—N. T. Pef, *Chicago, Ill.*

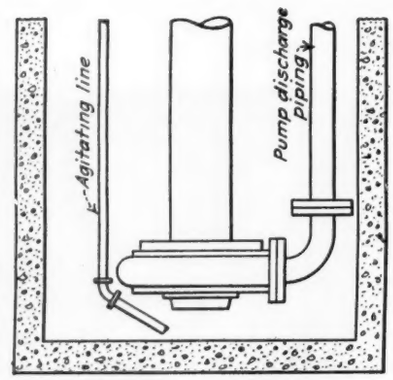

The pressure at A is higher than at B because A is closer to the source
A
The steam trap will favor kettle A
B
Kettle B will be partly filled with water to make up for the lower pressure

Sketch indicating why each steam-using device should have its own steam trap.

Improving Sump Pump Operation

SEDIMENT deposits in sump pits are a frequent cause of sump pump operating difficulties. These accumulations are especially bothersome where the liquids pumped contain certain quantities of undissolved solid matter. In handling these mixtures, the heavier particles of solid material have a tendency to drop out of suspension and build up in the bottom of the sump to such an extent that the pump suction opening is blocked. When this happens, a dirty and time-consuming cleaning job is usually required before the sump pump can be expected to operate satisfactorily.

Much of this inconvenience can be avoided by lessening accumulations in the sump. The larger pieces of material can be removed by screening the liquid before it flows into the pit. The fineness of the particles removed by screening devices is limited, however, by the frequency of cleaning required when screens having too small a mesh are installed. In any case, a mesh must be used fine enough to hold back any solids which the pump is incapable of handling.



Agitation line installed in sump.

Finely divided material passing through the screens is easily removed by the pump if this material is kept suspended in the liquid. As shown in the sketch a stream of water, under pressure from a pipe line terminating near the pump suction opening, affords a simple and effective method of agitating the mixture so that precipitation of the solids is avoided.—S. H. Coleman, *Roanoke, Va.*

Portable Stacker in Bakery

A BAKERY that uses a portable stacker for piling bags of flour, has found another use for this piece of equipment which has proved to be a great labor saver.

In this case the platform that is used for elevating the flour bags is removed and its place is taken by a set of arms. These arms are arranged to support the bowl from the mixer which prepares the cake batters. In this way, the bowl full of batter can be raised so that its contents can be dumped into the hopper of the machines which feed batter.—F. A. Westbrook, *Center Conway, N. H.*

Bathtub on Wheels

SHOULD a plant superintendent discover that he needs a corrosion resistant tank truck for conveying acid materials about the factory, he can obtain one from the closest plumbing supply house. An enameled bathtub meets this requirement very nicely, and for portability it can be placed on a truck or on a specially constructed chassis consisting of wooden bolsters with axles and wheels attached.

To Find Man for Job

WHEN a skilled laborer fails to report for work, or must be relieved because of illness or injury, another man with the same ability must be found to handle the job. And he must be obtained quickly if plant operations are not to be held up.

The meat packing house is a place where many skilled workers are employed. And to make skilled help available on any job at a moment's notice, Kingan & Co., Indianapolis, has set up a cross-indexed file of its workers. An index card bearing the name of the man is filed under each job that he can do.

NEW DISCOVERIES AND INVENTIONS

BRIEF REVIEWS OF NEW METHODS, PROCESSES, RESEARCH AND PATENTS IN THE FOOD INDUSTRIES

Ideas of Use to Production Men

Picked Up at the Pittsburgh Meeting of the American Chemical Society, September 7-10, 1936

Perhaps Vegetables Should Be Vacuumized Under Water Before Processing

THE MAIN LOSS of ascorbic acid (Vitamin C) from cabbage while cooking occurs during the period when it is coming to a boil. After all the air has been driven out of the cabbage there is very little further loss in continued cooking. About one-third of the Vitamin C of the cabbage is destroyed. However, some of it dissolves into the cooking water and is thereby lost.

From a paper by Donald K. Tressler, Stella Gould and G. C. King, New York Agricultural Experiment Station.

Preservation of Vitamin C is Extremely Variable

YOU cannot reason by analogy about the protection of water soluble vitamins, including Vitamin C, in fruit and vegetable products. It will work in one case and won't work in another.

Fermentation is very destructive of Vitamin C. Hard cider, citron and cucumber pickles lose all their C. Sauerkraut loses it sometimes and keeps it at others. Preserved or canned strawberries hold their C, but it cannot be satisfactorily retained in fresh cider, apple sauce or cranberry jelly.

From a paper by Carl R. Fellers, Massachusetts State College.

How to Reduce Bacteria in Conditioned Air

THE FOLLOWING paper suggests possibilities for all users of conditioned air, especially the macaroni industry. In an air-conditioned St. Louis office building the numbers of bacteria in the air increased from the beginning to the end of each week. This was found to follow a much greater increase of the numbers of bacteria in the spray wash water in the air conditioning equipment. This wash water is recirculated for a week and then thrown away. At the end of a week the bacterial counts are above a million per cubic centimeter of water.

It was suspected that the wash water was actually increasing the bacteria in the conditioned air far above the numbers present in outdoor air. Later events proved this to be true.

A search was made for some disinfectant that could be used in the spray wash water to sterilize it. It required a substance that was odorless, non-corrosive and with a low vapor pressure.

A mixture of orthobenzylphenol and parabenzylphenol was the thing that did the trick. It reduced the bacteria count in the wash water to almost zero, and reduced the numbers of bacteria in the conditioned air to about one-sixth of their outdoor count.

No studies were made on mold spores, but the idea keeps recurring that macaroni makers could profitably study this in a small experimental way. It is barely possible that it might show how to get away from the problem of molding when the rate of drying is slowed down.

From a paper by T. S. Carswell, H. K. Mason, and J. A. Doubly.

Preservation and Storage of Hen's Eggs

IF EGG YOLKS are frozen and then thawed, water will separate and there will be precipitated a lecithin-protein complex. Since this complex is very important in soluble form as an emulsifying agent, especially for mayonnaise manufacture, such a precipitation ruins the yolks for that purpose. It can be prevented by addition of sugar, glycerine or certain other unobjectionable food materials which will dissolve in the yolk and prevent this irreversible dehydration of the colloidal complex during freezing.

Tray or spray drying of yolks is satisfactory, but is no good for whites. The white of egg needs some change before drying such as fermentation which gives a proteolytic alteration of albumin.

Co_2 is very important in the preservation of shell eggs. Breakdown of the yolk is caused by osmotic transfer of water from white to yolk. Storage in 6 per cent CO_2 under refrigeration makes the eggs hold up very well. Storage in water glass has the effect of sealing the CO_2 inside the egg thus providing its own preservative.

From a paper by Paul F. Sharp. Cornell University.

Hydrogen Peroxide Leavened Cakes

ADOPTION of a slow baking procedure for cakes raises the percentage of peroxide that may be in the cake batter when it is introduced into the oven.

According to the method described in U. S. Patent No. 2,051,745 the quantity may be as high as 0.50 per cent of the weight of the flour in the batter. Heretofore (U. S. Patent No. 1,953,567), 0.08 per cent of the weight of the flour has been regarded as the upper limit of hydrogen peroxide permissible in the batter when it reached the oven if a first grade quality of cake was to be obtained. "First grade quality" cake is defined as a finished cake containing no free hydrogen peroxide and having a color, texture, and volume equal to or better than similar cakes in which baking powder or yeast is used as the leavening agent.

As defined in U. S. Patent No. 2,051,745 the "slow baking" procedure consists of (1) maintaining an oven temperature of 325 deg. F. or lower; (2) baking the cakes at higher oven temperatures in a "box" having wooden sides and an asbestos lined bottom; or (3) suspending the pan containing the batter on a shelf or tray in the oven out of contact with the direct heat of the oven.

The text of the patent gives in detail a formula and bakeshop technic for a cake made by this procedure. The initial hydrogen peroxide content of the batter is given as 1.06 per cent of the weight of the flour in the batter. The peroxide was added to the batter 2½ min. before the batter

was placed in the oven. Peroxide content decreased to 0.418 per cent on the flour in that time. Cake was baked 95 minutes at 300-325 deg. F.

At end of bake potassium iodide test failed to show presence of free hydrogen peroxide. Cake judged as being of very even texture, free from objectionable voids, light in color, and excellent in flavor.

Patent was granted to Joseph S. Reichert, Niagara Falls, N. Y., and William J. Sparks, Urbana, Ill.; assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Finds Lacquered Containers Safe

SYNTHETIC resin varnishes or lacquers for food tins, and the white phenolic resin enamels used in vinegar manufacture, must face the perennial suspicion of being toxic and therefore possibly dangerous to health. While the ingredients of phenolic resins, for example, are known to be toxic the accusers are reminded that these ingredients are chemically combined and at sterilization temperatures the lacquer is hardened to a state of extreme chemical inertness. Proof that no toxic substance can escape from this type of food-tin lacquer is supplied by exposure tests with fruit acids, vinegar, salt brines, hydrochloric acid and other corrosive materials under severe conditions. Well baked lacquer films under such tests have remained intact, with no weight loss which could be detected even by a delicate laboratory balance.

Abstracted from "Use of Synthetic Resin Varnishes in the Food and Beverage Industry" by Fritz Ohl. *Farbe und Lack*, 1936, pp 363-4. (Published in Germany)

Industrial Oils As By-Products of Food Processing

GRAPESEED oil and tomato seed oil, in search of new worlds to conquer, are looking beyond the edible oil field (where a highly refined product is required), and beyond the next most obvious outlets as soap stock and lubricants, to the wide field of paint and varnish vehicles. Because they are not good drying oils, they are not inherently suitable for use in paints. Hence their native properties must be altered by appropriate processing. The idea is not new but it has not been reduced to a practical, working idea in any of the previous attempts. As part of the great European scramble for national self-sufficiency, two Italian chemists have now found a way to ease the demand for imported drying oils by converting domestic seed oils into satisfactory paint or varnish vehicles.

They accomplish this by polymerization; the oil, bleached with decolorizing charcoal, is heated in a partial vacuum and a slow current of pure, dry carbon dioxide is bubbled through it. The preferred temperature is about 550-560 deg. F., maintained for about 2.5 hours for grapeseed oil or two hours for tomato seed oil. The products, in comparative tests, showed good drying properties and gave paints comparing excellently with linseed oil paints. The acidity of the polymerized oils is relatively high, so that they are not compatible with basic pigments, but this is easily remedied by neutralization.

Abstracted from "Polymerization of Some Nationally Produced Vegetable Oils", by Mario Brambilla and Giorgio Balbi. *Chimica e l'Industria* 18, pp 353-5, 399-400. 1936. (Published in Italy)

Nine-Hour Day for Tomatoes Increases Crop Yield

A SERIES of curious researches are being carried on in Russia to find out how to grow vegetables for canning where the season is too short. All Russia, it should be remembered, lies north of a line going through Chicago —Boston—Rome, and summers are short but the days are long.

This author has raised tomato plants from seeds up to flower-bud formation. By artificial shading he exposes some to nine hours of day-night, others to twelve hours, and still others take their daylight as it comes. After flower buds were formed the seedlings were transplanted and the crop grown in the usual way. In every case the nine-hour day seedlings yielded more fruit, heavier fruit than controls, the increase running from 13 to 44.1 per cent.

Shading the plants after flowering acts just the opposite.

Abstracted from "Light Regime Requirements of Tomatoes" by L. V. Michajvola. *Comptes Rendus (Doklady) de l'Académie des Sciences de l'URSS* 2, 201, 1936. (Published in Moscow)

Cause of "Whang" in Cane Syrups

RESULTS of experiments and testing at the Houma, La., field station of the Department of Agriculture, Carbohydrate Research Division, Bureau of Chemistry and Soils, into the suitability of different varieties of sugar cane for table syrup have been announced.

Only standard methods, boiling and skimming were used in the experiments and no chemical agents were employed for clarifying the product. The cane came from ten different plots. The semi-syrups were settled at 20 deg. Baume.

The experiments were designed to furnish the basis for accurate choice of cane for making the best quality of syrup, and to supplement investigations of yields and disease resistant characteristics of the different types of canes experimented with. Only flavor, color, and turbidity or syrup sediment of the various types were compared.

Cane with relatively lower ash content and acidity was adjudged to furnish the best syrup. The so-called "saltiness" and "whang" of syrups were found to be caused by organic and inorganic salts and by acidity.

CO_2 Speeds Up Churning Operation

TIME required for formation of butter is reduced to seconds by method described in U. S. Patent No. 2,051,797 granted August 18 to Paul Feremutsch, Zurich, Switzerland. Furthermore he claims his butter has a fresher and a more pleasant taste and that it will stay that way longer than butter made in the customary manner.

Supersaturation of the milk or cream with CO_2 under the pressure of several atmospheres during the churning is the procedure which does the trick.

Butter formation by previous methods is explained as being due to: (1) milk or cream being ripened by souring or acidification through bacterial action; (2) ripened cream or milk being mechanically agitated; (3) formation of a froth during this agitation.

New method provides for immediate ripening of cream or milk by forcing the acid-producing CO_2 gas into the churn under pressure. Mechanical agitation is as necessary in the new method as the old. Froth formation is claimed to be greater because of the greater number of gas bubbles present and a consequent increase in surface area contact between the cream or milk and the gas. Butter produced from strictly fresh milk or cream in this manner is judged as having a very low bacteria content and less liable to deterioration in flavor because of absence of bacterial action and of atmospheric oxygen.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

Indicating Controller

FOR CLOSE-THROTTLING control in installations where a record of the processing is not desired, an air operated controller for temperature and pressure has been introduced by Taylor Instrument Companies, Rochester, N. Y. Called "Fulscope," this type of control has been designed for simplicity and low cost. The instruments come in either high range or full range sensitivity, as required. Both designs are fully adjustable. The control point may be adjusted to any value within the control range. Direct-set is optional. Many ranges are available within the limits of —100 and 1,200 deg. F. temperature, and full vacuum and 3,000 lb. per sq.in. pressure.

Control Instruments

BRISTOL Co., Waterbury, Conn., have recently brought out two new control instruments.

One of these is a small-bulb gas-filled thermometer for measuring temperatures between —60 and 1,000 deg. F., where tubing lengths as long as 100 ft. or more are required. It is designed to compensate automatically for temperature changes in the case of the instrument and along the tubing.

The other instrument is called an Ampliset Free-Vane controller. It is a pneumatic controller for temperature, time-temperature, flow, liquid level, pressure, time-pressure, and humidity. In it the "Ampliset" principle has been combined with the "Metameter" system of remote control.

Open Mesh Conveyor Chain

FOR USE where a smooth belt conveyor of the metallic chain type is desired, Whitney Chain & Mfg. Co., Hartford, Conn., has introduced an open mesh conveyor chain. This is designed so that it presents a flat, smooth upper surface for conveying purposes. At the same time, it has an open mesh, useful in cases where an air stream is to pass through the conveyor, as in cooling operations. The chain is available in widths from about $3\frac{5}{8}$ in. up to $8\frac{1}{8}$ in.

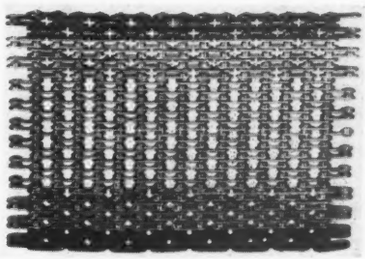
Indicating control instrument.

Sanitary Evaporator

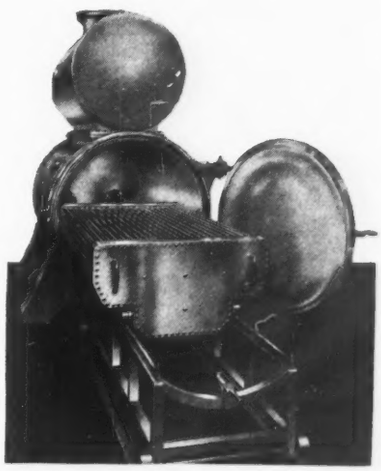
OAKLAND Copper and Brass Works, 1346 Seventh St., Oakland, Calif., are manufacturing the Zeitler evaporator. This evaporator, designed for use with condensed and evaporated milk, fruit juices, syrups, tomato products, and similar foods, is said to have the advantages of constant cleanliness, simplicity of operation, and low heat requirements.

This equipment may be had in stainless steel, nickel or other metals chosen to suit the product being evaporated. It consists, as shown in the accompanying photo, of the evaporator body, vapor dome, removable heating unit with track and cradle and all necessary connections. The track and cradle for the heating unit permit easy and complete sanitation. In addition, the equipment is designed without pockets or crevices.

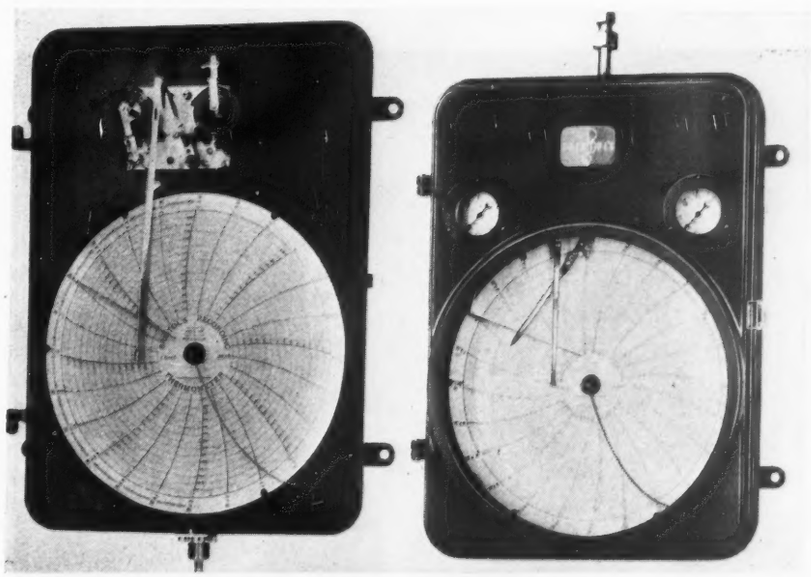
This evaporator can be used for either continuous or batch operation. It is built in capacities of from 2,000 to 20,000 lb. of water evaporation per hour.



Open-mesh conveyor chain.



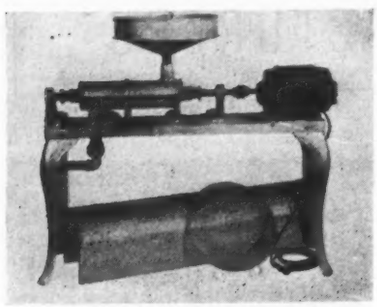
Sanitary evaporator for food products.



New Bristol control instruments.

Colloid Mixers

THE CRANE colloid mixer is a new type of equipment for mixing, emulsifying and dispersing ingredients, recently introduced by Colloid Equipment Co., 50 Church St., New York, N. Y. It is also used for reducing the viscosity of fluid mixtures and for aiding in the solution of solids.

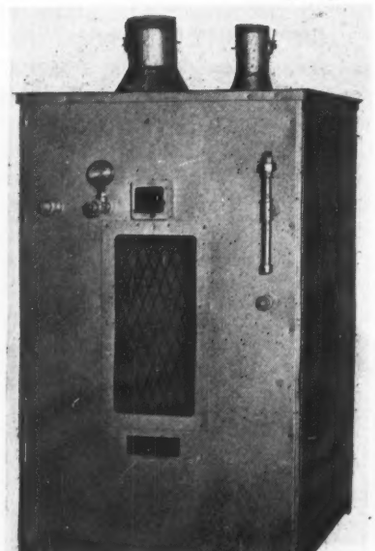


Colloid Mixer.

The device consists of fifteen notched disks, assembled on a shaft at an 18 deg. angle. These disks are rotated in a cylinder at 1,750 r.p.m. The angular setting of the disks, combined with the rotation of the assembly, gives a longitudinal wiping action as well as a rotary action. Combined with the high speed, great agitation is thus caused in any material passing through the cylinder. The mixer is made with a capacity of 250 gal. per hour and operates with a ½ hp. motor of 1,750 r.p.m., direct connected through a flexible coupling. By throttling the outlet, a finer dispersion is obtained, but with lowering of the capacity.

Dehumidifier

SIMPLE humidity control, combined with many other advantages, is claimed for a dehumidifier recently introduced by Lamson Co., Syracuse, N. Y. This device uses a solution of lithium chloride as a means of absorbing moisture. With it, it is possible closely to control the humidity of the air used in manufacturing processes or in work rooms. Also, drying can be effectively carried out with low temperature air in processes where high temperatures are not desired. With suitable accompanying accessories, this dehumidifier permits the delivery of air at any desired humidity, temperature and velocity.



Lithium chloride dehumidifier

Among the food products that have already been successfully dried with this apparatus are albumen and blood. It is also claimed for this device that it kills micro-organisms and prevents the accumulation of odors.

Electric Process Kettles

A LINE of electrically-heated process kettles has been placed on the market by Patterson Foundry and Machine Co., East Liverpool, Ohio. These kettles can be supplied in steel, stainless steel, aluminum, or other metals. Heat control is automatic. Any type of stirrers can be supplied, driven through a "Unipower" drive.

Vacuum Deaerator

FOR deaerating fruit juices, vegetable juices, and other similar products before canning, Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y., have developed a vacuum deaerator. The device consists of a cylindrical shell, containing a series of convex and concave baffles. These are arranged alternately, so that the liquid will flow in thin films, thus giving the maximum amount of exposed surface. The baffles are also arranged for easy removal for cleaning. Considerable space is provided in the upper part of the shell to permit settling of foam.

Vacuum is maintained by a steam jet evactor. If this is a single stage evactor, 27.5 to 28 inch of vacuum can be provided. When required, 29.7 inch of vacuum can be obtained with a two-stage evactor. If desired, a mechanical pump can be used in place of the evactor.

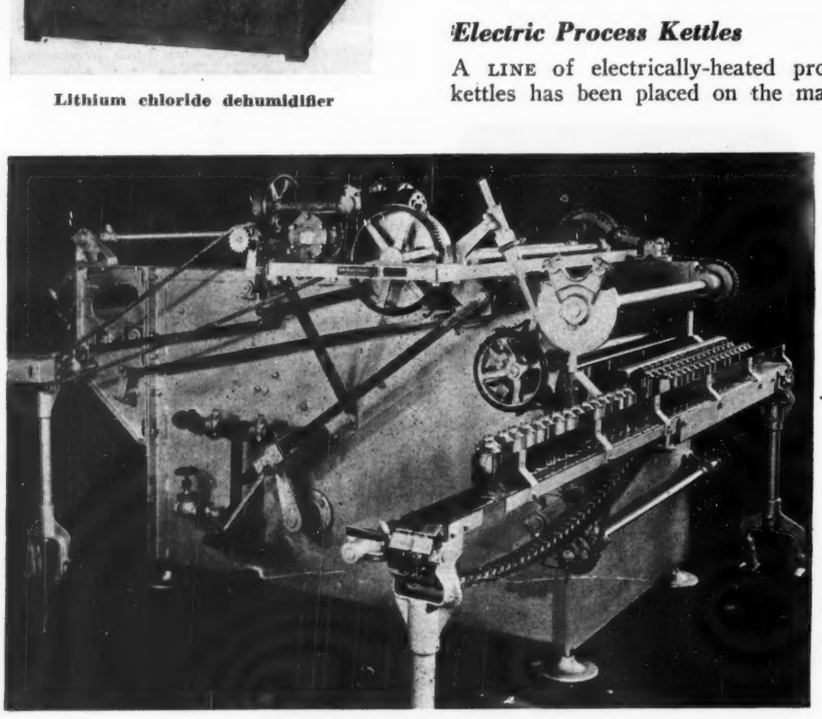
Washer For Beer Cans

AS AN OUTGROWTH of its design for a washer for corn beef cans, Barry-Wehmiller Machinery Co., 4660 West Florissant Ave., St. Louis, Mo., are now manufacturing a washer for cap-sealed beer cans. The washer is entirely automatic. Cans are loaded either by chute from the floor above, or by dumping cartons of cans upon a loading table and pushing them to the rotary feeding disk, or "Single Filer." This automatically sorts the cans into a single line and feeds them to the loading feeder which is a flat-topped chain belt conveyor. When the file of cans is in front of the washer, the loader moves them onto a stainless steel track.

A pusher-bar conveyor moves the cans through the machine, sliding them over the track. During this travel, the cans are given four internal rinsings. Two of these are by tapered-hole, undershot nozzles, which force a stream of water directly to the inside bottom surface of the cans. On its way out, this water flushes the side wall and shoulder. The other two rinsings are by means of rising spindles.

These four flushings clean every interior surface of the can. Further travel is allowed for draining, and the cans are then automatically discharged onto the conveyor which feeds the filler.

When desired, provision can be made for hot caustic pressure washing, followed by fresh water rinsing. Machines are made in capacities up to 250 cans per minute.



Washer for cap-sealed beer cans.

THE MANUFACTURERS OFFER

Food Plant Equipment

1. AIR-CONDITIONING EQUIPMENT—Buffalo Forge Co. Bulletin No. 3025 describes and specifies type CC evaporating condensers for use with Freon or methyl chloride refrigerants.

2. AIR CONDITIONING — Carbondale Machine Corp. Bulletin No. 1119 illustrates air-conditioning installations made by this company.

3. AIR CONDITIONING—Carrier Engineering Corp. A new booklet containing a reprint of a paper entitled "Progress in Air Conditioning in the Last Quarter Century," by Willis H. Carrier of this company, as read before the June 23, 1936 meeting of the American Society of Heating & Ventilating Engineers.

4. AGITATOR STORAGE TANK—The Pfaudler Co. Catalog 763 specifies and illustrates glass-lined storage tanks for milk, ice cream and similar products, using the "Streamflo" agitation.

5. CEREAL PUFFER—Nu-Vita Foods, Inc. Leaflet describing a cereal puffing machine for use with wheat, corn, rice and similar products.

6. ELEVATOR-CONVEYOR — Allis-Chalmers Mfg. Co. Leaflet 2226 describes the Nordyke service elevator, a vertical belt elevator for inter-floor travel for employees and for moving products.

7. GRINDING MILL DRIVE—Patterson Foundry & Machine Co. Illustrated bulletin describing a new drive for grinding mills and similar industrial equipment, embodying a magnetic brake and an inching device.

8. ICE MACHINERY—Flakice Corporation of New York. Bulletin 14, a 8-page publication describing the Type BRC, Form AP Flakice machine for making frozen water ribbons used in icing various food products.

9. PUMPING EQUIPMENT — Worthington Pump & Machinery Corp. Four new bulletins as follows: Bulletin L-711-B2, deals with belt driven and steam driven horizontal drive vacuum pumps, Type HBV, HBV-2, HSV, and HSV-2; W-310-B5, describes Type CF ball bearing, pressed steel frame mounted centrifugal pump, capacities from 10 to 130 gal. per minute; L-700-B1A, describes Type VV vertical vacuum pump for canning and similar industries; W-101-B6, bulletin describing Type VG horizontal duplex steam pump and receiver set.

10. REFRIGERATION—Carbondale Machine Corp. Bulletin 1105-A illustrates the Freon or methyl-chloride combined refrigerating unit made by this company for air conditioning and general refrigeration service.

11. REFRIGERATION—Frick Co. Two publications: Catalog H, a 36-page general catalog of ammonia valves and fittings; Bulletin No. 512-A, containing a list of industrial plants and public buildings using refrigeration made by this company for air-conditioning purposes.

12. VIBRATING SCREEN — Link-Belt Co. Catalog 1562, a 24-page general catalog of the vibrating screens made by this company.

Plant Supplies and Accessories

13. BOLTS, NUTS, SCREWS AND WASHERS—H. M. Harper Co. A new general catalog of bolts, nuts, screws, washers and rivets of various materials and for all purposes.

14. COPPER TUBING—Chase Brass & Copper Co. Three bulletins give specifications and describe applications of copper tubing and fittings for various purposes as follows: The Plumber's Manual of Copper Tube and Fittings; The Art of Sweating Copper Tube; Copper Tubing for Heating Lines.

15. ELECTRICAL EQUIPMENT — General Electric Co. Bulletin GEA-1522 C, describes the Type CR 1062 manual motor starting switches for direct current and alternating current single and three-phase motors; Bulletin GEL-531 discusses how business concerns are saving from $4,000 to $10,000 a year through the use of capacitators.

Packaging

16. ADHESIVE — National Adhesive Corp. The "Cellu-Meter" a circular dialing device for showing specific adhesive recommendations for sealing, combining and laminating certain packaging materials as Cellophane, Sylphrap, Protectoid, and Kodapak.

17. PACKAGING MATERIALS — Celluloid Corp. A 16-page leaflet entitled "Protectoid Transparent Packaging Material" illustrates the use of this transparent sheet for containers as well as for wrapping materials.

18. TRANSPARENT WRAPPING MATERIAL—E. I. du Pont de Nemours & Co. A 32-page illustrated bulletin entitled "A Study of Christmas Buying," illustrating packages using the transparent wrapping material, Cellophane, made by this company.

Control Equipment

19. BOILER WATER LEVEL CONTROL—Northern Equipment Co. Form No. 401 is a 4-page bulletin describing the controlling of boiler water level on rapidly fluctuating loads at the plant of the Pennsylvania Sugar Co., Philadelphia, Pa.

20. CONTROL INSTRUMENTS—Bristol Co. Bulletin No. 444 describes Model 90 pneumatic type controllers for temperature, liquid level, and pressure control.

G. L. Montgomery. October, 1936
Managing Editor, Food Industries,
330 W. 42nd St., New York, N. Y.

TO THE READER: Use this convenient form to order the bulletins you need.

Please obtain for me the bulletins indicated by the following numbers _____

_____

_____

Employer _____ Your Name _____

Position _____ Your Address _____

New PACKAGES and PRODUCTS

Food Softener

OUT of Japan comes a new food softener which is to be distributed throughout the world by Nippon Chemico-Industries. It is a light tan powder put up in small bottles and sold under the name of "Sofna." It is made from a proteolytic enzyme (presumably papain—Ed.) extracted from a plant belonging to the ficus family. The product is said to soften albuminous food within a few minutes without changing the flavor or color of the food. It also is supposed to aid digestion and absorption.

Smaller Package

IN A MOVE to sell more tablet sugar to housewives, American Sugar Refining Co., New York, has introduced a 1-lb. carton of Crystal Domino cubes. Two pounds had been the least that could be purchased, a quantity which goes a long way when the product is used only at coffee and tea time. To enable retailers to display the sparkling cubes of sucrose, American Sugar is packing in each container of 24 cartons one with a transparent window top.

Brazil-Nut Ice Cream

SOMETHING new in ice cream has been successfully introduced by Bon Palate Shoppe, Jersey City, N. J. It is a Brazil-nut flavor developed by Applied Sugar Laboratories. The nuts are included in butter snap brittle which is ground and put into the mix. This formula may be obtained from Brazil Nut Advertising Fund, New York.

Flavoring Oils

SEVERAL new flavoring oils have been introduced by Fritzsche Bros., Inc., New York. Produced at the company's plant at Seillans, France, these include Oil of Cumin, Oil Carrot Seed, Oil Marjoram Sweet, Oil Angelica Root, Oleoresin Celery and Oil Savory. The Oil of Cumin is said to be unusually strong, having a high cuminic aldehyde content. The Oil Marjoram Sweet is for seasoning meat products and it will duplicate the flavor of imported liver sausage. Oleoresin Celery contains not only the volatile aromatic principle of celery seed but valuable resins and other non-volatile extractives contributing taste values. In aroma, Oleoresin Celery is weaker than Oil Celery but it costs only about one-fourth as much. Oil Savory is useful for seasoning meats, soups and so forth. It has a flavor somewhat resembling that of Oils Origanum and Thyme.

Half-Gallon Beer Bottles

BOTTLES which hold 2 qts. are the latest vogue in beer containers. Equipped with a resealer, these large bottles are in demand at parties, picnics and small bars. They have been adopted by Hemrich Brewery, Seattle; Becker Brewery, Evanston, Wyo.; and Pilser Brewing Co., New York. These breweries find the large bottle popular.

Fruits in Olive Jar

THE TALL, cylindrical, wide-mouthed jars popular among olive packers are excellent containers for small fruits packed in liquor. This has been demonstrated by Lyons-Magnus, Inc., and E. G. Lyons & Raas Co., San Francisco. Desiring a luxury package, the company simply took a stock cylindrical jar, topped it with a black lithographed cap bearing a gold design and circled it near the bottom with gold-foil labels trimmed in black. Into this package it put Cherries in Creme de Menthe, Cherries in Marasquis Liqueur, Apricots in Brandy Syrup and Bing Cherries in Brandy. The container displays these products in an appetizing manner, and the black and gold labels and caps are quite effective against the brilliant green, bright red, golden and golden brown colors of the products.

Coronation Biscuits

AN EVENT of world-wide interest, the approaching coronation of King Edward VIII, has been capitalized upon in a package design adopted by Weston Biscuit Co., Ltd., Passaic, N. J. This manufacturer has introduced a new 1-lb. package of English Quality Biscuits under the name of Coronation Assortment. The carton pictures the pageantry of the coronation and also illustrates the biscuits included in the assortment. The package affords special opportunity to promote sales in Canada and the British Isles.

Repackaged Pickles

CRAMPTON CANNERIES, INC., boosted sales last year by adopting an easy-opening closure, the screw cap that is opened with a table knife. This year the Celina, Ohio, pickle and onion packer is going after an even greater business by repackaging its entire line. The same style of glass jar has been adopted for the White Villa, Sun Best and Premier brands. It is a slightly tapered container with a ribbed border around the front and back panels. With small labels, the packages clearly display their contents. On the smaller jars, a dressy white closure is used.

Tea Carton and Dispenser

NOT ONLY has John H. Wilkins Co., Washington, D. C., adopted new cartons for tea balls, but it has put the cartons into a dispenser. The packages and their dispenser are of paperboard with a colorful design. The dispenser is intended to be hung on the shelves or on the wall where the individual packages can be taken from it conveniently.

Twelve-in-One Cracker

BEECH-NUT PACKING CO., Canajoharie, N. Y., has introduced a new food. It is a cheese wafer, or cracker. The wafer is thin and is made in squares perforated so that it may be broken up into twelve tiny tidbits. It is packaged in 5-oz. cartons with a sealed outer wrapper printed in red, with blue and white lettering and a blue band across one end. The wrapper also pictures a wafer in its natural golden brown color. Underneath the outer covering is a heat-sealed, waxed-paper wrapper that gives double protection to the crispness of the crackers.

Pretty Packages

CONVENIENT containers which have high display value and a close family resemblance have been adopted by Stein-Hall Manufacturing Co., Chicago. This company distributes Hall Mark pearl barley, peas, tapioca, twenty-minute precooked beans, lentils and soup mixture, all put up in sealed, double-wall, transparent-cellulose bags. The bags are brilliantly colored at the ends. The two at the left in the illustration and the two at the right have red ends and blue lettering with a red border. The Tapioca bag, left center, has blue ends and blue lettering with narrow red bands near top and bottom. The newest of the products, the precooked beans, right center, is in a bag with white ends and black-bordered white lettering. Steps have been taken to prevent the bags from coming open during handling. A paper label is glued over the sealed folds at the top and a transparent sticker over those at the bottom.

Coronation
Wilkins
TEA BALLS
Beech-Nut
CHEESE
WAFERS

PROMOTING THE PRODUCT

▶ KELLOGG CO., Battle Creek, Mich., will sponsor broadcasts of Notre Dame football games this season over WTAM, Cleveland.

▶ SOUTHERN RICE INDUSTRY plans to enter new markets with supplementary newspaper advertising and cooking school activities during the fall and winter. National magazine advertising will be continued, as will dealer services and displays. A new edition of a 100-page recipe book will be distributed.

▶ GENERAL FOODS CORP., New York, will put Jack Benny back on the air on Oct. 4 in the interest of Jello. The company is also starting two new Sunday-evening programs on that date. One, promoting Calumet Baking Powder, will feature Phil Lord and will be broadcast over the NBC Blue network. The other is in the interest of Minute Tapioca. Colonel Stoopnagle and Budd will be the performers and the NBC Blue network the medium. Still another program sponsored by General Foods went on the air Sept. 28. It features Helen Hayes, is heard over the NBC Blue network on Monday evenings and promotes Sanka Coffee.

▶ DOUGHNUT CORP. OF AMERICA, New York, is making October national doughnut month. Newspapers, radio, stage and screen are being used to instill the doughnut appetite in new consumers. Doughnut Corp. will sell complete advertising material to bakers wishing to join the promotional activity.

▶ ADOLPH GOBEL, INC., New York, went on the air over WOR, Sept. 18, with a new program, "Allie Lowe Miles Club." It is a Friday-night broadcast.

▶ CALIFORNIA FRUIT GROWER'S EXCHANGE, Los Angeles, will raise additional advertising funds through a new levy of two cents per box on citrus fruit. This brings the advertising appropriation to seven cents a box.

▶ CALIFORNIA DRIED-FRUIT STABILIZATION COMMITTEE, San Francisco, has secured the cooperation of 37,000 stores in a nationwide drive to sell California dried fruits. More than 5,000 newspapers will be used by the stores.

▶ CAMPBELL SOUP CO. will continue its "Hollywood Hotel" radio program for another year. It has also renewed the George Burns-Gracie Allen broadcast which promotes tomato juice. Both programs are over a nation-wide CBS network.

▶ AMERICAN CRANBERRY EXCHANGE will start a newspaper campaign in the United States and Canada during the week of Oct. 12. The promotion, which will be educational, will also be carried on through a few selected national publications.

▶ NATIONAL BISCUIT CO., New York, started a new Friday-night program over the NBC Blue network on Oct. 2.

▶ GEORGE A. HORMEL & CO., is introducing a newspaper and magazine advertising campaign this month in cooperation with General Mills, Inc., and Lea & Perrins, Inc. Complete courses will be merchandised, including soups, biscuits and Worcestershire sauce.

▶ WILSON & CO., Chicago, will continue its newspaper and radio promotion for "Tender Made" hams.

▶ WINE INSTITUTE will advertise the health, food and social values of wine and will try to induce distributors to improve quality.

▶ PETER PAUL, Naugatuck, Conn., recently launched a nation-wide advertising and sampling campaign. Four million coupons will be distributed through Sunday comics in 31 cities. Coupon holders will receive a free package of Dreams with every purchase of Mounds.

▶ STANDARD BRANDS, INC., New York, has introduced a novel radio program, "The Chase & Sanborn Good-Will Court," over the NBC Red network. A Sunday-night program, it involves the unofficial litigation of real legal cases.

▶ AMERICAN CAN CO., New York, is distributing 15,000 sets of demonstration cans among home economists. A booklet, "A Word About Tin Cans," accompanies each set of cans.

▶ SEALTEST LABORATORIES, INC., subsidiary of National Dairy Products Corp., New York, will start a new radio program Oct. 17 over the NBC Red network. It will be broadcast on Saturday night.

▶ WISCONSIN DEPARTMENT OF AGRICULTURE AND MARKETS is bringing before 4,600,000 readers of two leading women's magazines a series of five advertising messages containing tempting suggestions for the use of Wisconsin cheese.

▶ BRAZIL NUT ADVERTISING FUND, New York, has issued a twelve-page recipe booklet for bakers.

COOPERATIVE COLOR FILM

California Fruit Growers' Exchange, Los Angeles, has prepared a color film which will promote Sunkist citrus fruits along with the products of five other national advertisers. Released last month, the picture has a guaranteed exhibition before 2,000,000 home economics teachers, students and homekeepers in the next two years. The five other organizations participating include: Calavo Growers, Fruit Dispatch, Armour & Co., Borden Co. and Frigidaire. Typical of the food combinations shown in the new film is the smart service of citrus fruits, bananas and calavos.

PRACTICAL PROBLEMS OF TRUCK TRANSPORTATION

DISCUSSED BY EXECUTIVES IN THE FOOD INDUSTRIES

Decelerometer Best

ANSWERS to the questions on truck brakes follow:

1. All trucks, regardless of weight, should be able to stop in the same distance at the same speed, but this is not true. Trucks of heavier weight will not stop in the same distance that a lighter truck will at a given speed.

2. I believe that the State of Massachusetts laws for the distance at which a truck should stop at 20 miles per hour is fair to both the truck owner and the highway department. This distance is, for a two-wheel-brake car, 45 ft.; trucks, 50 ft. For four-wheel brakes: cars, 30 ft.; trucks, 40 ft. Trucks are not tested above the 20-mile-an-hour speed. I believe that if a truck is capable of stopping at this distance it is a safe car to operate on the highways or in a city's congested area.

3. We measure the distance in a brake test with a deceleration meter.

4. It is always a question whether any other method is correct due to the fact that different people's minds work at different speeds. In the case of making a test without a deceleration meter, it is natural to assume our average garage man measures his distance from some given point to the stop. We do not consider this official testing.

5. It is not possible to obtain equal stopping distances with service and emergency brakes on all trucks, although we find that some lighter trucks will give an equal stopping distance and in some instances, better. This is due to the type of emergency brake that might be in a truck, or the condition of the linings.

6. I do not believe it necessary that the manufacturer provide emergency brakes equal to the capacity of the service brakes inasmuch as it would be a more expensive installation and possibly would not be used enough considering the expense. Most drivers use the emergency brake merely as a parking brake, possibly due to the fact that the manufacturers in the past have built them more on a parking brake design. In the State of Massachusetts, at 20 miles an hour, emergency brakes must stop vehicles in 80 ft. This would indicate that the State highway department does not expect the emergency brake to perform equal to the service brake.—*Superintendent of Motor Vehicles of a large Eastern bakery.*

Requirements of Truck Brakes; Methods of Testing

Question No. 18

From a safety standpoint, do you believe that:

1. All trucks, regardless of gross weight, should be capable of stopping in the same distance when traveling at the same speed?

2. If so, what distance should this be when traveling at 20 miles an hour?

3. In testing your truck brakes, how is this distance measured?

4. Can it be measured in any other way than by a deceleration meter?

5. Is it possible to obtain equal stopping distance with service and emergency brakes?

6. If not, do you believe that truck manufacturers should provide emergency brakes at equal capacity to service brakes?

Uses New Tires, Tubes

WE have not had a great deal of experience with using used tires from passenger cars and trucks. What little we have used them they have proven satisfactory. Relative to puncture-proof tubes or puncture sealing compounds we believe cost is prohibitive.

It is our general policy to use new tires and tubes for our milk-wagon equipment, using a four-ply tire. We have found it practical, however, to have our worn truck and passenger car tires retreaded locally.—R. C. FISHER, *Vice-President & General Manager, R. F. Worden & Sons, Inc., Waterbury, Conn.*

Prefers New Tires

THE following is in answer to the questions on pneumatic tires for horse wagons:

1. Tires worn smooth have approximately 25 per cent of the original thickness remaining. Furthermore, the carcass of the tire has certainly been weakened to considerable extent, so much so that putting such tires on a wagon, which has to carry a 2,800-lb. load, does not appear to be the best practice. The tubes, whether seconds or new, have no bearing whatsoever on the puncture influences.

2. We have had no experience with puncture-proof tubes or puncture sealing compounds on pneumatic-tired horse wagons. From our experience on the above, on automobiles, we have no reason to believe that they would be of any great value in strengthening worn tires for the pneumatic-tired horse wagons.

3. Using 500x19 four-ply casings plus new tubes, along with the necessary change over axles and brakes, cost approximately $70 per wagon.

4. As old tires have lost approximately 75 per cent of their original thickness, and as the fabric of the tire lends itself to punctures, since there is no rubber tread to protect it, we would naturally expect a high frequency of punctures.

5. We are inclined to favor the unit using new tires and tubes.—L. T. WHITE, *St. Louis Dairy Co., St. Louis, Mo.*

Best Tire-and-Tube Combination for Wagons

Question No. 19

1. Do tires removed from passenger cars and trucks, because the treads are worn smooth, have sufficient protection against punctures when used with second-grade but new inner tubes for equipping horse wagons?

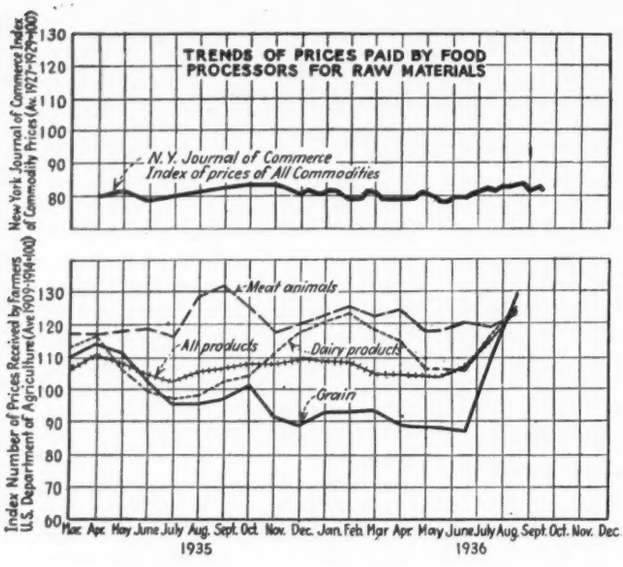
2. If not, should puncture-proof tubes or puncture sealing compounds be used with worn automotive tires?

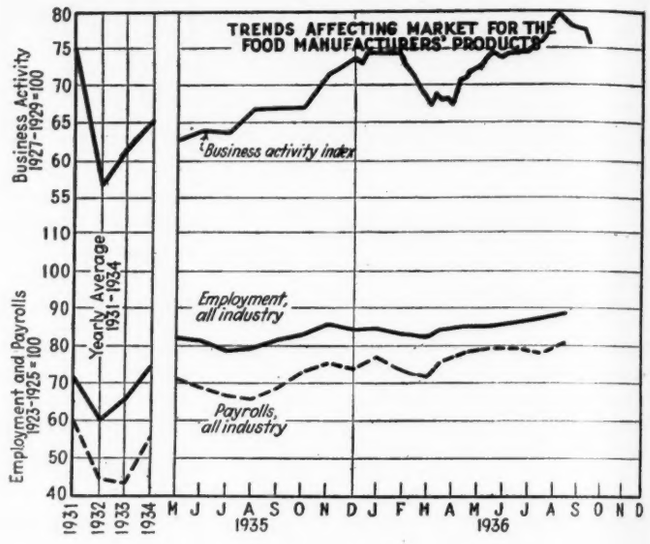
3. What is the comparative first cost of such combinations as given above with new tires and tubes?

4. Also, what is the relative freedom from punctures with the old-tire-and-tube combinations and new tires and tubes?

5. Which combination gives the lowest tire cost per mile?

BUSINESS TRENDS


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
N.Y. Journal of Commerce Index of prices of All Commodities
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave 1909-1914=100)
Meat animals
All products
Dairy products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar Apr. May June July Aug. Sept. Oct. Nov. Dec.
1935
1936


TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Business Activity 1927-1929=100
Business activity index
Employment and Payrolls 1923-1925=100
Yearly Average 1931-1934
Employment, all industry
Payrolls, all industry
1931 1932 1933 1934 M J J A S O N D J F M A M J J A S O N D
1935
1936

Drought Situation

RAINS above the seasonal normal in late August and the first two weeks of September came too late to improve greatly the summer crop picture. Some improvement was reported in the corn yield, but not enough to count for much.

However, the situation as to fall forage crops and pastures has been considerably bettered. Rains in the Lake States and in the Mississippi and Ohio River valleys have encouraged farmers to plant forage crops that can be used as pasture this fall. Also, natural pasturage has been greatly benefited in such states as Wisconsin and Minnesota. As a consequence, the outlook for farm animals and for dairy products has improved. Both the dairy and meat packing industries can look forward to the winter with more confidence than was justified a month ago.

In the Plains States and the Southwest, the improvement has not been so great. Kansas had some good rainfalls and the prospects for winter wheat are thereby improved. Northern Texas, eastern Oklahoma and western Arkansas have had no relief. After the worst drought on record, Nebraska and the Dakotas still lack sufficient moisture to give much promise for 1937 wheat.

Some improvement in the prospects for late canning crops are noted. Sweet corn yield was estimated on Sept. 15 at 10 per cent above the Aug. 15 forecast. Slight improvement is also reported in the tomato crop for canning, the prospects for this crop already being the highest in years. Rains also brought the snap bean crop prospects up to 73,000 tons, exactly the 1928-1932 average and comparing to 81,500 tons in 1935.

World Wheat Situation

SUPPLIES of wheat throughout the world, for the crop year 1936-1937, are forecast by the U.S. Department of Agriculture's Bureau of Agricultural Economics at 320,000,000 bu. less than last year. Production in all countries except Russia and China is estimated to be 3,444,000,000 bu., a decrease of about 110,000,000 bu. The world carryover at the beginning of the current crop year was approximately 744,000,000 bu., about 210,000,000 bu. less than a year ago.

Imports into the United States from Canada are to be expected in the light of this situation and the known shortage of bread wheats in this country, according to The Thomas Page Mill Co., of Topeka. However, Europe will also be dependent upon North American supplies for some of its wheat, and the resulting demand upon Canada will tend to slow up import of Canadian wheat into the United States. Domestic bread wheat production in 1936 in the Southwest is estimated at 211,000,000 bu., compared to 149,000,000 bu. in 1935 and 164,000,000 bu. in 1934. Consequently the need for import of bread wheat would not be so great as in other recent years, except for diminished carryover.

Construction News

	Pending (thousands)	Awarded September (thousands)	Total Awarded 1936 (thousands)
Bakery	$187	$132	$1,430
Beverages	990	642	5,518
Canning and Preserving	40	40	221
Confectionery	.....	.....	30
Grain Mill Products	744	600	3,617
Ice Manufactured	.....	.....	394
Meats and Meat Products	301	195	2,337
Milk Products	160	.....	984
Miscellaneous	651	1,961	4,856
	$3,073	$3,570	$19,387

More Frozen Foods

INCREASES in the pack of frozen foods for direct consumption, in spite of the drought conditions, is reported by the New York *Journal of Commerce*. This publication quotes a wholesale house in Richmond, Va., as reporting its purchases of peas as close to 100,000 lb. this year, with similar quantities of lima beans and strawberries. The same journal reports large packs this year of the following frozen foods: peas, lima beans, asparagus, broccoli, blueberries, apples, strawberries and raspberries.

Sugar Supplies High

WORLD sugar supplies for the 1935-1936 marketing season are now estimated by the United States Department of Agriculture at 31,386,000 short tons of raw sugar, including both cane and

Business Feels Labor Day Layoff

LABOR DAY has for many years been regarded as the date on which the dull summer season comes to an end and the busy autumn season begins. This year it marked a high point on the curve of business activity which began its steady upward climb following the eastern floods as well as midwest drought and dust-storm conditions of late March. Coming at its latest possible date the holiday layoff depressed the September indexes of business improvement to such an extent that the *Business Week* index of general business conditions stands at 76.6 per cent of "normal"; a decline of 1.16 per cent for the three weeks ending Sept. 19.

Industry as a whole has not suffered any such setback. Steel production is continuing to increase; industrial and domestic construction is expanding; carloading figures are climbing; coal mining shows no lessening in volume; electric power demand is still growing; and factory employment is increasing. These are only a few of the indications that industry is continuing its summer activity.

Commodity prices turned downward during the middle of the month but are still higher than they were at the end of August. Wholesale prices for all commodities reported by the U.S. Department of Labor for three weeks ending Sept. 19 are 0.25 per cent higher. Those for farm products and foods advanced 1.80 and 0.73 per cent respectively. The New York *Journal of Commerce* general index of weighted prices rose 4.18 per cent for four weeks ending Sept. 26. Grain prices jumped 3.73 per cent while those for food receded 1.29 per cent.

beet. While not a record high, only one year, 1930-1931, with a total of 31,530,000, exceeded this amount.

Consumption of sugar throughout the world is running somewhat above previous years. Because of this fact, prices have advanced throughout the year, in spite of the increased supply. Price levels are now said to be highest since 1927.

Stocks of sugar at the beginning of the 1935-1936 marketing year were the smallest since 1928-1929. This is the third successive year in which carryover stocks have declined. On June 1, 1936, the visible supply of sugar in fifteen important countries was about 1,500,000 tons smaller than on the same date of the year before.

Lamborn & Co. estimates that sugar consumption in the United States for the first seven months of 1936 was 3,553,812 tons, 0.6 per cent more than in the first seven months of 1935. Consumption in the fourteen principal European countries, for the first eleven months of the current marketing year, September, 1935, through July, 1936, was 7,213,050 tons. This is an increase of 4.4 per cent over consumption for the same eleven months of the preceding marketing year.

Beet sugar production in the United States has increased. This year's crop is forecast by Lamborn & Co. at 9,056,000 tons of beets, compared to 7,908,000 tons produced in 1935. A normal sugar yield from this crop would give a total of 1,440,000 short tons of beet sugar.

Cocoa Trend Reversed

CONSUMPTION of cocoa beans for 1936, estimated by W. R. Grace & Co., of New York, at 713,218 tons, will be above shipments for the first time since 1930. Cocoa bean shipments this year are expected to total 672,000 tons, compared to shipments of 675,000 tons in 1935, when consumption equaled 655,000 tons.

Decreased production in some of the principal areas is coupled this year with increased consumption. Estimates released in London predict a cocoa crop on the West African Gold Coast of only 260,000 tons, less than either last year or the year before.

Cocoa prices have naturally reacted to this supply and demand situation. After crossing the 7 cent mark in August, they continued to rise through September, except for a slight set back around the middle of the month. The demand has continued strong in the face of this price increase, and large tonnages have been sold. On Sept. 14, the New York Cocoa Exchange reported sales of 14,083 tons, the third largest day in its history and the biggest sales since 1933.

INDICATORS

PEAR PRODUCTION on the Pacific Coast is estimated at 18,717,000 boxes, a record crop and 3,500,000 boxes more than the 1935 yield.

ASPARAGUS canned in 1936, all varieties, is reported by the National Canners Association at 2,781,712 cases.

SALMON PACK in Alaska was an all-time record this year, totaling 7,878,000 cases up to Aug. 22, with a few districts still to hear from.

RECORD GRAPEFRUIT PRODUCTION is forecast, with from 13,000,000 to 18,000,000 boxes from Florida, and from 10,000,000 to 14,000,000 boxes from Texas.

CORN ground in the first eight months of 1936 for producers of starches, syrups and other corn products totaled 48,935,035 bu., compared to 34,054,343 bu. in the same months of 1935.

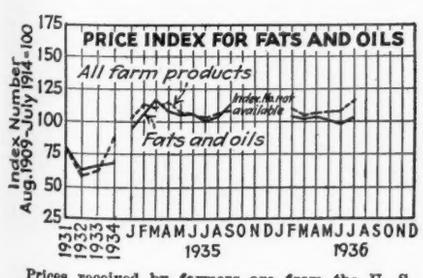
FEED GRAIN production this year, in spite of the drought, is estimated at 58,000,000 tons, compared to 54,000,000 tons in 1934.

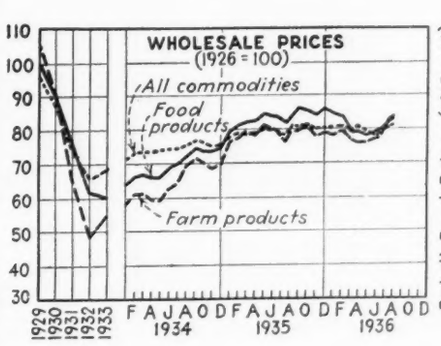
CARLOADINGS in September, 1936, were at levels approximately 25 per cent above the 1935 loadings.

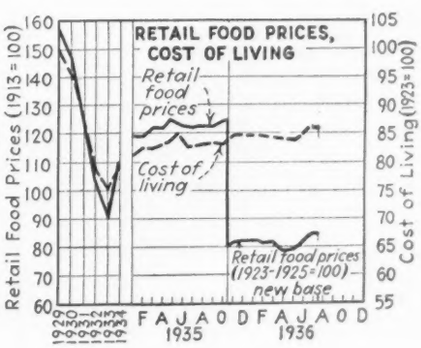
FOOD PRICE INDEX of Dun & Bradstreet, in the middle of September was at $2.84, compared to $2.77 a year before, and 1 cent below the six year peak established in August, 1936.

SALES of confectionery and competitive chocolate products in July, 1936, were $11,688,762, compared to $10,841,715 in July, 1935, an increase of 7.8 per cent.

APPLE production in the U. S. for 1936 is estimated by the New York State College of Agriculture at 47 per cent of normal, cherries at 8 per cent below the 1935 crop, and peaches at 25 per cent below normal.







Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board. Data concerning fats and oils is from the American Bureau of Raw Materials.

KEEPING UP WITH THE FIELD

Legislation — Trade Practices — Labor Problems — Safety — Freight Charges — Industry Activities

Patman Predicament. Food manufacturers have not been able to clear the fog surrounding provisions of the Robinson-Patman Act. They are still studying the law, and some are endeavoring to work out methods whereby discounts and allowances can be renewed without conflict with the measure.

The move on the part of Great Atlantic & Pacific Tea Co. and one or two other large grocery chains to obtain advertising allowances apparently met with failure. According to Paul S. Willis, president of Associated Grocery Manufacturers of America, information received from members of AGMA indicates that the majority of manufacturers have not renewed advertising contracts with A & P or with any other of their distributors.

Resumption of advertising arrangements depends upon development of a plan extending such arrangements to all classes of distributors on proportionately equal terms, Mr. Willis said. Both legal and accounting problems must be surmounted before such a plan can be put into effect.

Hershey Chocolate Co., Hershey, Pa., seems to be the first important food manufacturer to publish a list of quantity discounts. It has revised its first schedule and now offers a carload discount of 2 per cent with no additional quantity discount. The schedule also allows a 5 per cent sales featuring allowance and makes a general advertising offer of 25 to 35 cents a box for the next month.

During the three months in which the Robinson-Patman Act has been in operation, some food companies have lost volume and some have gained, but the changes have not been large, according to American Institute of Food Distribution, Inc.

So far, the Federal Trade Commission has not acted upon any of the many complaints of violation of the law, and some industry leaders are of the opinion that appropriations will be needed from Congress before the commission will be able to enforce the measure effectively. At present, the commission lacks attorneys, accountants and field men necessary to do the job.

An effort to obtain amendments to the anti-price discrimination law will be made when Congress convenes again, Hector Lazo, executive vice-president of Cooperative Food Distributors of America recently indicated. The object will be to clarify provisions relating to payment of brokerage compensation, quantity discounts and other practices.

Preservers Get Code. Preserve manufacturers at last have a code of fair trade practices with which to police their industry. Long sought by National Preservers' Association, which represents 70 per cent of the industry, the code was blessed with approval by the Federal Trade Commission on Sept. 8.

Now the problem before the industry is one of enforcement. And the Association plans to assist the FTC by maintaining a careful watch for violations. Already one case complaint has been filed with FTC. It charges National Kream Co., Brooklyn, N. Y., with failing to comply with the standards of the code. The hearing has been set for the middle of this month, a new record in the handling of such cases. Conviction will bring a "cease and desist" order from the Commission. Such an order can be enforced if necessary through a mandate from U. S. Court of Appeals.

The preservers' code includes three rules. One bars misleading or deceptive selling, advertising, describing, branding, marking, labeling or packing. Another requires imitation products to be clearly and prominently marked. The third rules out the practice of withholding from or inserting in the invoice statements which make the invoice false. Rule 1 includes definitions and standards covering the various products of the industry.

Milk Muddle. Milk distributors in many sections of the country are between two fires—demands from producers for higher prices and reluctance on the part of consumers to pay more for milk. Farmers say that production costs have risen as a result of drought-parched pastures and higher feed bills. Consumers agree that the farmer ought to be paid more, but they want any increase in the price to come out of the pocket of the distributor.

In New York, the city that consumes 3,000,000 quarts of milk daily, the situation has become extremely intense. Farmers in the New York milkshed

KEEPS EGGS FRESH LONGER

Pores of the egg shell are sealed in a process developed by Bureau of Chemistry and Soils. The eggs are dipped in mineral oil in a partial vacuum. Then carbon dioxide is released into the chamber and enough oil is drawn into the pores of the shell to effect a complete seal. The carbon dioxide also has a stabilizing effect on the egg white. The treatment has been found to be 35 per cent more effective than plain dipping in mineral oil and 173 per cent more efficient than storage with no oil treament.

started talking strike late in August. They wanted an increase in price to $3 a hundred pounds, abolition of the classified plan and other concessions. On Aug. 16 the price was boosted from $2.45 to $2.70, and on Sept. 25 there was another rise which brought class 1 fluid milk to $2.90. Still the farmers talked strike.

Meanwhile the large distributors hiked the price to consumers by one cent a quart on Sept. 5. But important independent distributors continued to sell at the old price, the mayor and health commissioner openly opposed the step taken by the large companies, and consumers complained. So within two weeks Dairymen's League, Borden Co. and Sheffield Farms Co. reduced prices to their former level.

Strike Closes Mills. Flour milling operations virtually came to a standstill in Minneapolis early last month. All but one of the twelve big mills either were closed or had their operations greatly curtailed by pickets sympathizing with the striking members of Flour, Feed, Cereal and Elevator Workers' Union. Some 40 elevators also were closed.

The plant of Atkinson Milling Co. was the one which continued to operate. It had signed an agreement with a union more than a year ago and renewed the contract early in September. The companies whose mills were closed included Pillsbury Flour Mills Co., Russell-Miller Milling Co., Standard Milling Co., Fruen Milling Co., Minneapolis Milling Co., King Midas Mill Co. and Washburn Crosby Co., Inc.

The trouble arose from demands for union recognition and for wage increases of from 10 to 20 per cent. No agreements had been reached late in September, but the union had put its case before the National Labor Relations Board. It told the NLRB that the mill managers refused to permit collective bargaining, as required by the Wagner Labor Act.

Loading Charge. Western trunk lines are fighting a proposal that would have the effect of increasing by $3 per car the charges received by Union Stock Yards for loading and unloading. The proposed change involves a division of Chicago Great Western's through rate.

Application of the tariff has been suspended by the Interstate Commerce Commission for seven months from Sept. 15, pending an investigation. Intimating that Chicago Great Western, now in bankruptcy, is merely a cat's paw, the trunk lines allege that Union Stock Yards and Armour & Co., of Delaware, have the same board chairman.

The change would raise charges from $1.25 for single-deck and $1.50 for double-deck cars to $4.25 and $4.50, respectively. The object, according to the protesting line-haul roads, is to increase the revenue of Union Stock Yards at their expense by forcing them, through competition from traffic, to adopt the same basis.

Food Symposium. Food processing and preserving was the subject of a big symposium at the meeting of the American Chemical Society in Pittsburgh last month. Though attendance at this symposium was not as great as at the one at Swampscott, Mass., in 1928, where standing room was at a premium, it was a feature of the convention.

Preservation of fruits and vegetables by canning and freezing, storage and transportation of fresh fruits and vegetables, history of the developments in processing of dairy products, preservation and storage of eggs, packaging of meats, recent technical developments in the meat packing industry and enzymic tendering of meats were discussed. Considerable attention was also devoted to the problem of vitamin preservation. (See page 530 for abstracts).

Tentative plans were made for a symposium on flavors in foods for the 1937 spring meeting.

Your process equipment Safe DESERVES CLEANING!

Your food handling equipment represents a substantial investment. Modern engineering skill has made it easy to clean. But when you clean, do it the SAFE, dependable Oakite way and avoid harming or etching of surfaces with which food comes in contact. Oakite materials are designed to give you thorough, rapid cleaning at low cost and at the same time, to provide protection to process equipment surfaces.

These and other advantages are the reasons for the wide preference for Oakite materials in food plants everywhere today . . . why we ask the opportunity of demonstrating how you can more easily and consistently maintain high sanitary standards at all times.

Use This New, Quicker Way to Destroy Mold Growth and Bacteria

A NEW development in sterilization now enables you to more RAPIDLY and SURELY destroy mold growths and bacteria. Different, more powerful, instantly and completely soluble, easy to use and handle, OAKITE BACTERICIDE gives you just the advantages you want most in a sterilizing material. Descriptive booklet FREE on request. May we hear from you?

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Babassu Oil. Faced with constantly increasing imports of babassu oil, dairy and other food interests are planning an appeal to Congress for a tax of three cents per pound on oleo containing the South American product.

Under the terms of the reciprocal trade agreement with Brazil, the oil can not be taxed, but this treaty agreement does not apply to products containing the oil. And, according to estimates made in Washington, almost 25 per cent of babassu oil is being used in the manufacture of oleo for American consumption.

In a statement issued by the National Dairy Union, it is pointed out that upward of 10,000,000 lb. of babassu was used in the making of oleo during the months of March, April, May, June and July of this year, in direct competition with American fats and oils.

But interests favoring trade treaties insist that the whole babassu matter is a tempest in the tea-pot. They quote official figures. The total oil imports for the first half of the year came to 1,279,000,000 lb. Of this only 25,000,000 lb. or less than 2 per cent, was babassu oil.

Also they are declaring that until the imposition of the 3 cent per pound tax on coconut oil, it was impossible to import babassu, since the costs of such importation are higher than for the coconut product. The price of babassu as of Sept. 10, was 8¼ cents per pound as compared with 8½ cents per pound for coconut oil.

Tomato Labels. No form of label declaration will be held to offset violations of the Food & Drug Act in the use of color in artificially colored tomato paste and other comminuted tomato products. The Food & Drug Administration has issued notice to that effect. The administration makes it plain that label declaration of added color in foods brings the product into conformity with the act only when the color hides no damage or inferiorty.

Government Contracts. The long-awaited regulations clarifying the Walsh-Healey government contract act are out. And the interpretation put on this new law by Secretary Perkins is not nearly as drastic as business had feared though, in the opinion of many, its scope has been stretched far beyond the intent of Congress.

Briefly generalized, the new requirements that a food manufacturer must meet in fulfilling contracts awarded after Sept. 27 are:

He must, insofar as direct labor is concerned, avoid the knowing employment of convicts or of male or female laborers under the age of sixteen and eighteen, respectively.

He must comply with safety, sanitary and factory inspection laws of the locality where the work is performed.

He must adhere to a work schedule not exceeding 8 hours per day, 40 hours per week, or pay overtime wages for any excess at a rate one and one-half times the normal scale.

Another requirement in the law, providing for the payment of not less than the prevailing wage rates as determined by the Secretary, is suspended for an indefinite period.

Butter Quality. There has been a marked improvement in the so-called "dirty butter" situation, according to the Food & Drug Administration. This results from general improvement throughout the country in the speed with which cream is transported from farm to creamery. But much remains to be done in some sections, officials point out.

State officials have been aiding the government in this campaign, and the cream industry itself has been lending all possible assistance, particularly in the dairy states.

In the fiscal year ending June 30, 1935, the government inspected the equivalent of nearly 208,000 eight-gallon

15-ton capacity semi-trailer built of Alcoa Aluminum alloys by Highway Trailer Co., for Cargill Warehouse Co.

BONUS-LOAD is a MUST for hauling Wheat

Only the most economical form of transport can truck wheat profitably.

Load limits are held down by highway restrictions. Load weights are forced up by the irresistible pressure of operating cost. Deadweight *must* be at a minimum, payload *must* reach the highest attainable figure, to show profit.

To solve the problem, big semi-trailers are built light, with Alcoa Aluminum alloys. Instead of unnecessary deadweight, they carry the extra load necessary for profit. Usually such "Bonus Load" adds to normal profits; here Bonus Load *is* the whole profit.

This example again proves how Alcoa Aluminum gives an extra margin that can put extra dollars in the operator's pocket.

For hauling any food Alcoa Aluminum has an additional basic advantage — Aluminum is Friendly to Food. It does not affect color, flavor, odor, or quality. Since it cannot rust, cleaning is a simple, inexpensive matter.

Alcoa Aluminum comes in special shapes and forms which enable your body builder to meet your specifications economically. Write for our free book "*Alcoa Aluminum for Truck Bodies*," giving full information.

ALUMINUM COMPANY OF AMERICA,
2152 Gulf Bldg., Pittsburgh, Pa.

ALCOA · ALUMINUM

cans of cream from interstate and intrastate sources. Of this the equivalent of 8,000 eight-gallon cans were found unfit.

Coffee Convention. Many aspects of the Robinson-Patman law have yet to be proven constitutional, such as functional discounts about which the measure says nothing. This was the opinion expressed by Edwin B. George, of Dun & Bradstreet, Inc., at the convention of Associated Coffee Industries of America in Pittsburgh, Sept. 21-23. "If functional discounts are out," he explained, "business will have to revamp. If they are in, many problems will arise." He also stated that business policies frequently are built on guesswork and that now industry must face specific questions. Failure of the Robinson-Patman act will not squelch the urge for legislation along similar lines, Mr. George warned.

Herbert Delafield, president of the Association, said that lack of profits has discouraged the independent distributor. And he urged individual companies to assume the responsibility of minimizing profitless prices and of curtailing supplies to cut-throat retailers.

Secretary W. F. Williamson reported that constructive advertising had increased the consumption of iced coffee. He also touched on the problems of adulteration and misbranding, urging roasters to aid government bodies in inspection and enforcement work. It is high time, he said, for the industry to realize the soundness of value and quality.

It was revealed at the meeting that the National Coffee Department of Brazil will renew acceptance of the association's proposal for cooperation in financing a coffee-promotion campaign on condition that similar cooperation is secured from other countries.

The association reelected Herbert Delafield president.

Spray Danger. Improvement has been noted this season in the handling of sprays for fruits and vegetables. While less poisonous insecticides have not been developed for fruits, several which are more or less satisfactory for use on vegetables have been perfected. These are far less poisonous to man than the former lead-arsenates. Among them are derris and pyrethrum. But most satisfaction is reported in the use of the new synthetic compound of sulphur, phenothiazene.

The greatest advance, say the Department of Agriculture experts, has been in the attitude of the food industry as a whole, which has shown a marked and growing appreciation of the essential need for removing the poisonous spray residue.

CONVENTIONS

OCTOBER

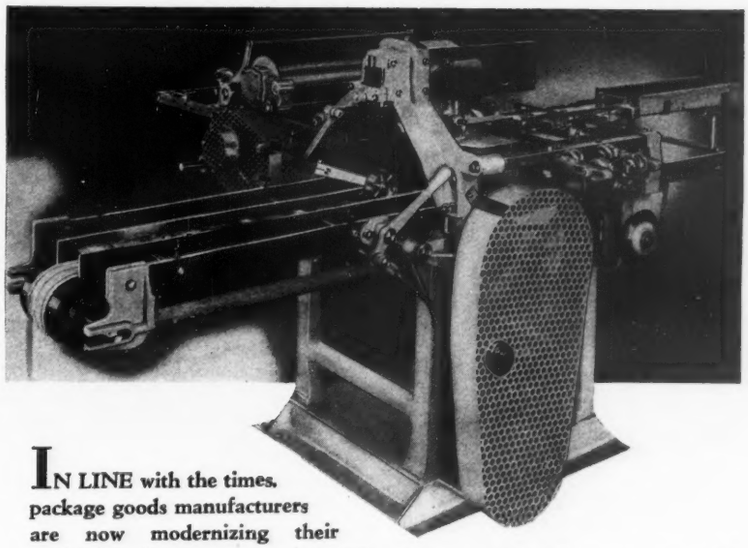
5-9—National Safety Congress and Exposition, Atlantic City.
9-13—Institute of American Meat Packers, Blackstone Hotel, Chicago.
10-18—National Dairy Association, Dallas.
12-13—National Poultry, Butter and Egg Association, Chicago.
12 (week of)—Ninth Dairy Industries Exposition, Convention Hall, Atlantic City, N. J.
12-14—International Association of Milk Dealers, Haddon Hall, Atlantic City, N. J.
15-17—International Association of Ice Cream Manufacturers. Ambassador Hotel, Atlantic City, N. J.
19-23—American Bottlers of Carbonated Beverages, convention and exposition, Morrison Hotel, Chicago.

NOVEMBER

8-10—New England Bakers' Association, Statler Hotel, Boston.
9-11—National Food Distributors' Association, Southern regional meeting, Hotel Adolphus, Dallas.
10-11—National Creamery Buttermakers' Association, Stoddard Hotel, La Crosse, Wis.
10-14—Second Poultry Industries Exposition, Port Authority Bldg., New York.
11-13—Pacific Coast Annual Dairy Conference, Olympic Hotel, Seattle, Wash.
17-19—Southern Association of Ice Cream Manufacturers, Arlington Hotel, Hot Springs, Ark.
30-Dec. 2—Associated Grocery Manufacturers of America, Waldorf-Astoria Hotel, New York, N. Y.

Why they are selecting this machine

TO MODERNIZE PACKAGING DEPARTMENTS



IN LINE with the times, package goods manufacturers are now modernizing their packaging departments to improve production efficiency and lower costs . . . Most of these concerns are selecting our FA wrapping machine, because of its reasonable price, wide range of adjustability for various sized packages, and its many modern features.

The FA is suprisingly simple in construction, considering its versatility, and it operates with astonishing smoothness.

Changes from one size package to another are quickly and easily made by simple adjustments and the substitution of interchangeable parts.

Uses practically any material

Can be equipped to handle transparent cellulose, glassine, waxed paper, foil or paper wrappers. For printed material in roll form, electric eye registration is furnished —locates the printing accurately on the package.

Important Savings

The FA offers you the opportunity of obtaining the utmost economy in labor, material costs and floor space, for an unusually small investment. It often pays for itself in a few months' time.

Write for information

PACKAGE MACHINERY COMPANY • SPRINGFIELD, MASSACHUSETTS
New York Chicago Cleveland Los Angeles
Mexico: D. F. Apartado 2303. Peterborough, England: Baker Perkins, Ltd.
Melbourne, Australia: Baker Perkins, Pty., Ltd.

PACKAGE MACHINERY COMPANY
Over 200 Million Packages per day are wrapped on our Machines

Ads Sell Industry. Selling the American industrial system to the public is the basis of an interesting series of five full-page ads now appearing in daily papers in large industrial centers. The series, sponsored by National Association of Manufacturers and National Industrial Council, covers: (1) What is your America all about; (2) The Myth About Men and Machines; (3) A Word to the Wise Woman; (4) Two Billion People Envy You; (5) Industry Speaks of the Future.

These ads are a part of the campaign of industry to defend itself against unjustifiable attacks originating in ignorance of the true facts.

Icing Charge. Increased charges for servicing and icing refrigerator cars have been suspended until further order by Interstate Commerce Commission. This comes as the result of a temporary, 60-day injunction obtained by food manufacturers in the United States District Court at Chicago. Two suits were instituted at the close of August, one by 25 dairy products companies and associations and the other by four large Chicago meat packers.

THE MOST *Flexible* FILLER YOU HAVE EVER SEEN . . . . .

So versatile it will fill practically *any* kind of container with almost *any* kind of material, the Stokes & Smith Universal Filler, with Gross Weight Scale, comprises four different machines in one single unit. These are:

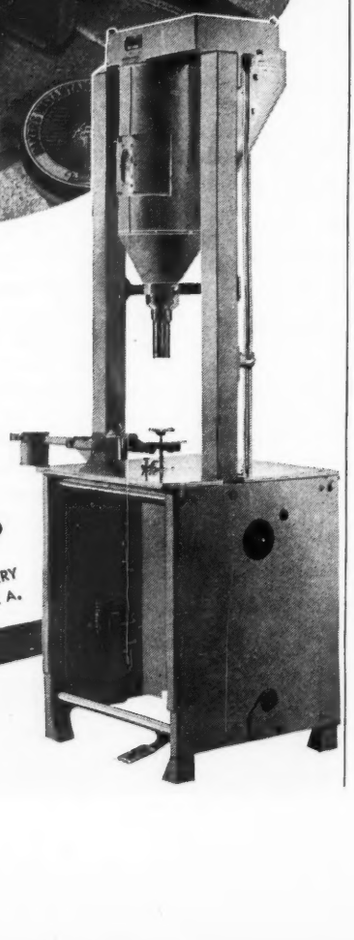
1. *A gross weight scale with auger feed.*
2. *A volumetric filler measuring material by the volume of the package.*
3. *A volumetric filler measuring material by the turns of the auger, a very precise way for the smaller quantities.*
4. *A packing machine to compress the material into packages.*

Changing from one type of container to another, even from any paste to free-flowing powder, is only a few minutes work.

May we arrange a demonstration for you?

STOKES & SMITH Co

PACKAGING MACHINERY · PAPER BOX MACHINERY
4911 Summerdale Avenue, Philadelphia, U. S. A.



Soybean Safety. Advice on how to prevent dust and solvent-vapor explosions was given by Dr. David J. Price, chief of the chemical engineering division of the Bureau of Chemistry and Soils, in an address before American Soybean Association on Sept. 15. His outstanding recommendations were:

1. Follow the safety code for terminal grain elevators, with good housekeeping as the prime essential to minimizing dust.
2. Observe in milling and processing operations the provisions for dust control in the flour and feed mill code.
3. Segregate elevating, grinding, and milling processes, if feasible, with adequate roof and wall vents to minimize explosion damage.
4. Observe similar precautions in plants preparing protein products, particularly in drying.
5. Segregate dryers where inflammable dust may be present.
6. Install dust collectors, outside if possible, otherwise with generous venting.
7. For extraction units, observe all customary solvent precautions of recognized codes.
8. If inflammable solvents are used, install inflammable-vapor detector.

CONCENTRATES

• Meat packers, millers and others "unjustly enriched" by the return of processing taxes have been given more time to pay the "windfall" tax. The deadline has been extended from Sept. 15 to Dec. 15.

• *Quotas on imports of syrups and sugar mixtures which compete with ordinary sugar have been imposed by the Agricultural Adjustment Administration. Effective Jan. 1, the 1936 quotas are: Cuba, 7,937,453 gal.; Dominican Republic, 820,894; Great Britain, 16,368.*

• Suit to recover $250,000 in processing taxes paid on coconut oil, palm oil and similar products has been filed in federal district court by Armour & Co. Working of coconut-oil fats has been ruled to constitute taxable processing under the Revenue Act of 1934. Armour maintains that the ruling is unwarranted and illegal.

• *Standard laws governing the production of ice cream in the South are sought by Southern Association of Ice Cream Manufacturers. A committee has been appointed to draft a uniform bill.*

• The Federal Trade Commission has completed its survey of conditions affecting the sale and distribution of milk and other dairy products. Publication of a summation report is contemplated, but it is not expected to appear before election.

MEN, JOBS AND COMPANIES

Industry

• ARMOUR & Co. has opened a new $50,000 packing plant at Raleigh, N. C.

• BAY STATE FISHERIES, Boston, is adding three new diesel-powered trawlers equipped with nickel-lined holds, at a cost of $600,000.

• CARNATION Co. will build a large condensery at Galax, Va., early next year. The company recently purchased the Marlowe plant at Gratiot, Wis., and will equip it for condensing milk. Carnation has also started work on a $30,000 milk plant at Rushville, Ohio.

• COCA-COLA Co. will build a million-dollar plant in Kearny, N. J. The plant will be located on the Lincoln Highway.

• COLEER CITRUS PRODUCTS Co., New York, has been taken over by Julian S. Cohen, but will continue under the same name. The capacity of the plant at Colton, Calif., will be doubled.

• JACOB DOLD PACKING Co. has moved its Memphis branch into larger quarters to accommodate an increase of 35 to 40 per cent in business.

• DUNCAN COFFEE Co. plans to erect a coffee roasting plant at Corpus Christi, Texas.

• FAIRMONT CREAMERY Co. is simplifying its corporate structure by dissolving state corporates.

• GENERAL BREWING CORP. has completed plans for a $500,000 addition to its plant in San Francisco.

• GENERAL MILLS Co., Minneapolis, will erect a grain elevator and feed warehouse in Richland Center, Wis.

• H. J. HEINZ Co. is expanding its pickle plant at Holland, Mich., and will build a $60,000 factory at Medina, N. Y.

• W. J. LAKE Co. has begun work on a $50,000 oyster-processing and shell-crushing plant at South Bend, Wash.

• MICHIGAN SUGAR Co., Detroit, is constructing a $100,000 plant as a supplement to its Alma factory.

• SPRECKELS SUGAR Co. has contracted for the construction of a new $2,000,000 factory at Woodland, Calif.

• STOKELY BROS. & Co., Indianapolis, Ind., has issued $1,487,500 in new common stock to obtain additional working capital to handle an increased volume of business.

• SUNCREST FARMS, INC., Brooklyn, N. Y., recently opened a modern milk bottling plant at Washington, N. J. Paper containers only are used in this plant.

• SWIFT & Co. will build a $150,000 plant at Youngstown, Ohio. The company also has completed plans for a branch plant at Lake Charles, La., and it has purchased the Faulkner Dairy Co., Conway, Ark.

HERE'S ONE TAX *you* CAN ELIMINATE

YOU may be paying a tax on materials handling. Frequently the lifting, hauling and storing of goods—an unproductive yet essential operation in every industry—add excessive costs to production. Inefficient methods slow up plant operation and make it difficult to meet competitive prices without losing money on orders.

The difference between the operating cost of a Yale Handlift Truck System and that of antiquated equipment (often Yale shows a saving as high as 80%) is a tax on your business.

Examine your materials handling methods and see if you are being needlessly taxed. A Yale Engineer will gladly assist you in your survey and recommend equipment that will serve you most efficiently and economically.

MODELS AND CAPACITIES TO FIT EVERY LOAD AND EVERY INDUSTRY.

THE YALE & TOWNE MFG. CO.
Philadelphia Division, Phila., Pa., U. S. A.

TRADE YALE MARK

Personnel

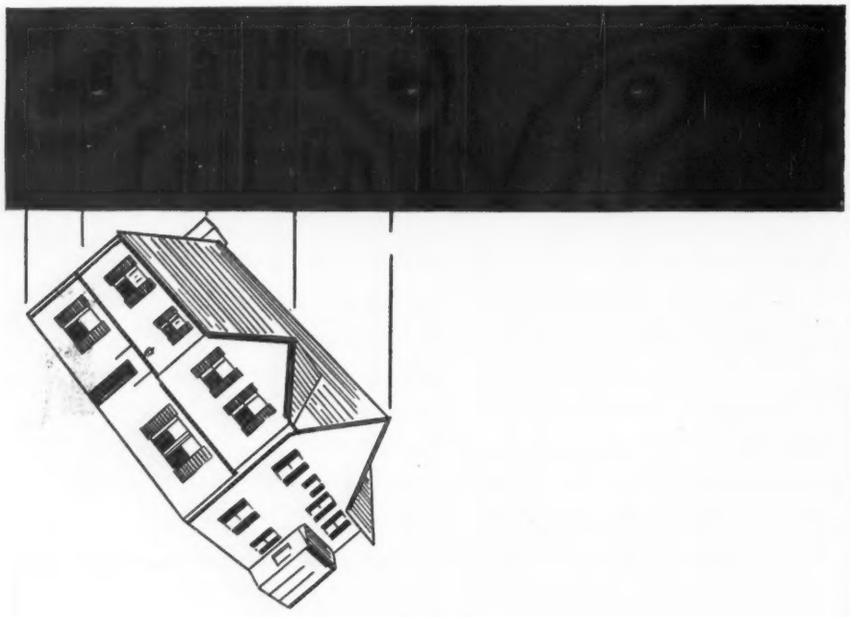
• GEORGE BANNISTER, JR., for 25 years with Libby, McNeill & Libby, where he was assistant general sales manager, recently left that company and formed Bannister Associates, Philadelphia food-brokerage and sales-promotion concern.

• A. E. DANIELSON has been put in charge of the Tifton, Ga., branch of Armour & Co., succeeding the late J. E. Holmes.

• MARRINER S. ECCLES has been elected president of Amalgamated Sugar Co., Ogden, Utah. He is chairman of the Federal Reserve Board and a banker and industrial leader.

• W. H. B. FOWLER, San Francisco, recently was elected president of Island Pineapple Co. John J. Barrett was made first vice-president.

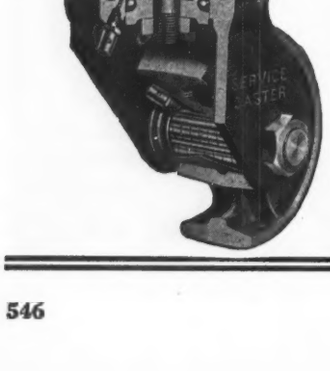
• JAMES M. GWIN, formerly chief inspector of the Connecticut Department of Agriculture, has been appointed head of Armour & Co.'s egg operations in the East.



If you choose materials handling equipment on its ability to take punishment, then you're ready to buy the SERVICE ForgeWeld Caster . . . This is the easy-swiveling wheel for every heavy duty floor truck, dolly, portable machine or box truck in your plant. No load is heavy enough to break its back. That's because of the way that SERVICE ForgeWeld is made. For the secret of its great strength, read its specifications below and study the cut-away view. To find out more about the lifetime service of this friction-free caster write for free full descriptive circular.

SERVICE

ForgeWeld Caster



Ni-Steel-Iron Wheel
One-piece King Bolt and Plate.
Drop-forged S. A. E. 1045 Steel.
Brinell Rating 230.
Machine Races — Service Ball Bearings.
Hyatt Bearing Wheel.
Alemite-Zerk Lubrication.

SERVICE CASTER & TRUCK CO.
525 N. Albion St., Albion, Mich.

• H. C. HARTMAN, manager of National Biscuit Co.'s plant at Huntington, W. Va., has been transferred to Louisville, Ky., to be manager of the company's plant there. He is succeeded at Huntington by G. D. McCreight, Lexington, Ky.

• HENRY F. HECKMAN, formerly head of the National Biscuit Co. agency in Phillipsburg, N. J., is now manager of the company's office in Quincy, Mass.

• H. H. HIRSCH is now in charge of the production department of Byrnes Candy Co., Chicago. He formerly was with Flavour Candy Co.

• NORMAN F. KRUSE heads up the new research department of Central Soya Co., Decatur, Ind. He formerly was a chemist with Procter & Gamble Co.

• THOMAS M. MANCHESTER has become president of Union Biscuit Co., St. Louis, to replace the late Harry W. Stegall.

• LEON MANDEVILLE, manager of Collins Baking Co. at Asheville, N. C., recently was advanced to executive assistant to L. M. Collins with headquarters at Atlanta.

• R. E. O'CONNELL has been named head of the cattle department of John Morrell & Co. at Ottumwa, Iowa. He had been cattle buyer for the company at Topeka.

• P. R. OLIVER, assistant manager of Swift & Co., at Springfield, Mo., has been appointed manager of the recently acquired plant of Faulkner Dairy Co., Conway, Ark.

• D. R. SINCLAIR is now president of Kingan & Co., Indianapolis, having succeeded R. S. Sinclair who retired because of his health.

• G. P. SINKS succeeds the late R. L. Fleiger as manager of the Dayton, Ohio, cone bakery of National Biscuit Co. He had been in charge of the company's cone plant at Portland, Ore.

Deaths

• EDWIN C. CARLSON, 54, president and general manager of Surebest Bakery, Dallas, secretary-treasurer of Dallas Baking Club and organizer and president of Southwest Baking Co., Aug. 31.

• WARD FALLGATTER, 59, partner in the milling firm of Fisher & Fallgatter, Waupaca, Wis., Sept. 11.

• CHARLES H. FOREMAN, 62, owner of

HARRY S. ELDRED

He succeeds the late Harry G. Mills as vice-president of Armour & Co., Chicago, in charge of plant operations. He had been general manager in charge of production.

the Lancaster, Ohio, dairy company bearing his name, Sept. 4.

• P. H. GRENNAN, 47, president of Farm Crest Bakeries, Detroit, Sept. 4. He organized Grennan Bakeries on a national scale and headed the company until 1929, when he retired. He later organized the Farm Crest company.

• GEORGE C. HINKLEY, 74, superintendent of plants of United States Milling Co., Sept. 13, at West Allis, Wis.

• CHARLES R. HOODLESS, 60, general superintendent of Pennsylvania Sugar Co.'s refinery at Philadelphia for 20 years, Aug. 29.

• DR. E. O. JORDAN, 70, professor emeritus of the department of hygiene and bacteriology at University of Chicago, Sept. 2. One of the world's most famous bacteriologists, he did much to explode fallacies concerning ptomaine poisoning.

• EDWARD B. LEWIS, 66, vice-president of Borden Co., New York, and member of the company's executive committee, Sept. 20. He was president of Horton Ice Cream Co. before it merged with Borden, and he helped found International Association of Ice Cream Manufacturers.

• WILLIAM WALSH, 78, retired vice-president of Reid Ice Cream Corp. and a pioneer ice cream manufacturer in New York, recently.

• JOSEPHINE W. WUPPERMANN, 84, president of Angostura-Wuppermann Corp. since 1915, Sept. 17, at Greenwich, Conn. She is said to be the first woman to be active head of such a large corporation.

Associated Industries

• CREAMERY PACKAGE MANUFACTURING Co. has appointed K. F. Colson manager of the branch at Omaha.

• EDWARD ERMOLD Co. announces the election of W. Eugene Blauvelt as secretary.

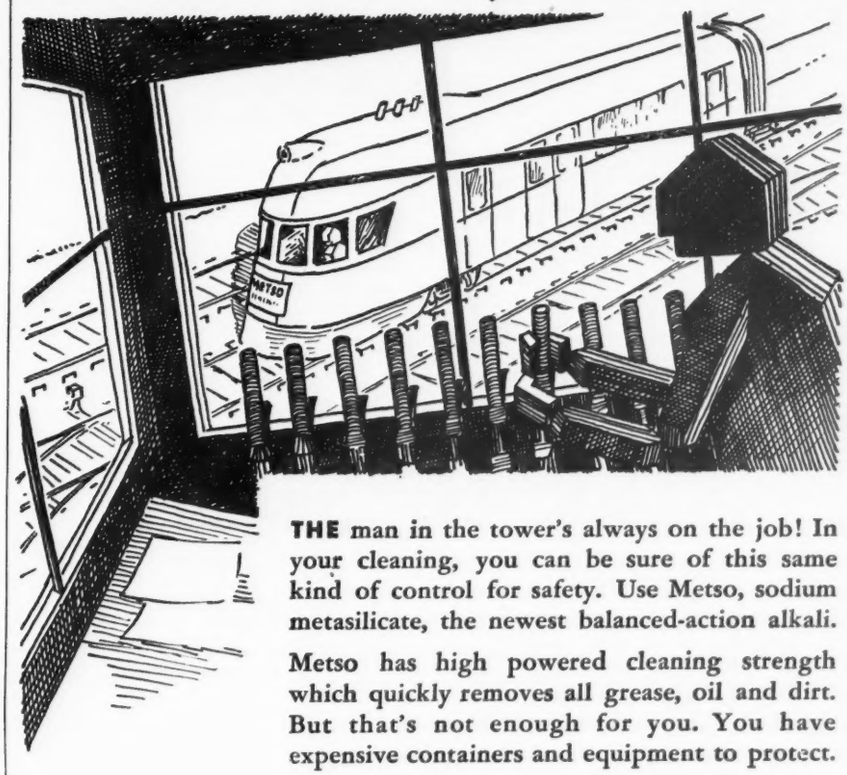
• B. F. GOODRICH Co. has appointed W. W. Gill assistant manager of the truck and bus tire department.

• JOHNS-MANVILLE, New York, has made J. F. Stone staff manager of the refrigeration section of the insulation department.

• NATIONAL BROKERAGE Co., INC., Pittsburgh, has employed Mrs. H. I. McKinley as office manager.

• OWENS-ILLINOIS CAN Co., Toledo, has leased a factory building at Clearing, Ill., to manufacture packers cans.

METSO "TOWER MAN"
switches cleaning TO SAFETY



THE man in the tower's always on the job! In your cleaning, you can be sure of this same kind of control for safety. Use Metso, sodium metasilicate, the newest balanced-action alkali.

Metso has high powered cleaning strength which quickly removes all grease, oil and dirt. But that's not enough for you. You have expensive containers and equipment to protect.

Metso has a correctly balanced silica content that insures safe cleaning on sensitive surfaces such as tin, aluminum and glass.

Does your cleaner take off more than dirt? Try Metso. It costs no more.

● *Stop at Booth 709 Dairy Exposition*

Send for Booklet: From a Locomotive to a Pig

PHILADELPHIA QUARTZ COMPANY

General Offices and Laboratory: 125 S. Third St., Phila., Pa. Chicago Sales Office: Engineering Bldg. Distributors in 60 cities. Sold in Canada by National Silicates Ltd., Toronto. U. S. Pat. 1898707

EST. 1831

METSO CLEANERS

BOOKS RECEIVED

FLOUR MILLING PROCESSES. By J. H. Scott. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1936. 416 pp., 6x9 in. Cloth, illustrated. Price $7.50.

As engineer and miller for twelve years with a large English milling company the author has made a study of milling in England and other countries including United States. His study covers both large and small mills and the theoretical as well as the practical side of milling.

Compilation of the contents of the book has extended over eight years. Most of the experimental work reported has been done by the author. However, reference is made to results obtained by others of recognized authority and to problems still under investigation. All phases of the industry from wheat cleaning to characteristics of commercial flours are discussed. In fact the book is divided into two parts. Part I deals with wheat treatment. Milling comprises the subject matter of Part II. A 20-page appendix details the mathematical mechanics of roll grinding and sieving.

CARBON DIOXIDE. By Elton L. Quinn and Charles L. Jones. Published as American Chemical Society Monograph No. 72 by Reinhold Publishing Co., 330 West 42d St., New York, N. Y., 1936. 294 pp., 6¼ x 9¼ in., Cloth, illustrated. Price $7.50.

As a refrigerant, a protecting atmosphere constituent, and a product of fermentation, carbon dioxide is well known throughout the field of food manufacture. In this treatise carbon dioxide is viewed as an industrial commodity and as a chemical. Information concerning it is presented for the industrial worker, the research student, and the general reader who wants to know about carbon dioxide and its properties as well as its origin and its uses.

WHY QUIT OUR OWN. By George N. Peek with Samuel Crowther. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1936. 353 pp., 5¾x8¾ in. Board. Price 50 cents.

Published as a vehicle for a suggested program for American farms and factories this book is in truth a recital of Mr. Peek's experiences as AAA Administrator and Special Adviser to the President on Foreign Trade. About half of its contents were published in the *Saturday Evening Post* under the title of "In and Out."

Not often do the rank and file of industry and agriculture have such an opportunity to get an easily read account of what takes place in governmental officialdom when there is a conflict over economic policies.

YEARBOOK OF AGRICULTURE 1936. Published by U. S. Department of Agriculture, Washington, D. C., 1189 pp. 6½x9¼ in., cloth, illustrated. Price $1.25 from Superintendent of Documents, Washington, D. C.

Long regarded as a one-volume encyclopedia of Agricultural statistics this annual report to the President has this year expanded into two volumes. The statistical aspect of the report, covering 1935 activities, is confined to a 421-page paper-bound volume which is obtainable from the Superintendent of Documents for fifty cents.

The social-economic portion of the report departs from giving brief summaries of new developments in Agriculture. It is presented in this separate volume of 1189 pages and is devoted largely to the single subject of plant and animal genetics. Forward looking food manufacturers will be especially interested in the chapters on wheat, barley, oats, rice, corn, sugar cane and beets, beef and dairy cattle, hogs, sheep and poultry.

AUTOMOTIVE MONEY-SAVING FACTS. By J. F. Winchester. Published by The Traffic Publishing Co., 100 Sixth Ave., New York, N. Y., 1936. 417 pp., 6¾x9¾ in., cloth. Price $3.

Saving money in his automotive department is as important to the food manufacturer as saving it in any other department. Written essentially for those identified with the transportation industry, the contents of this book apply to the problems faced by those responsible for the operation and maintenance of company cars and trucks.

PATENTS

Bakery Products Leavened by Oxygen Liberated During Proofing—Joseph S. Reichert, Niagara Falls, N. Y., and William J. Sparks, Urbana, Ill., to the E. I. duPont de Nemours & Co., Inc., Wilmington, Del. No. 2,051,745. Aug. 18, 1936.

Butter Churned in an Atmosphere of Carbon Dioxide Gas Under Greater Than Atmospheric Pressure—Paul Feremutsch, Zurich, Switzerland. No. 2,051,797. Aug. 18, 1936.

Emulsion Comprised of a Fatty Material, an Aqueous Material, and a Higher Aliphatic Ether of a Polyhydric Alcohol—Benjamin R. Harris, Chicago, Ill. No. 2,052,026. Aug. 25, 1936.

Egg Composition Containing a Hydrophillic Colloid and a Hydrophillic Lipin, a Derivative of a Polyhydroxy Substance Having a Lipophile Radical and an Unesterified Hydroxy Group—Benjamin R. Harris and Marvin C. Reynolds, Chicago, Ill. No. 2,052,028. Aug. 25, 1936.

Sausages Linked on a Frame Structure Which Constricts Casing at Points Which Give Links of Desired Length—George A. Hillery, New Orleans, La. No. 2,052,092, Aug. 25, 1936.

Coloring for Fatty Materials Made From an Oil-Soluble Dye and Finely Divided Anhydrous Dextrose—Carl H. Haurand, North Plainfield, N. J., to Best Foods, Inc., New York, N. Y. No. 2,052,175, Aug. 25, 1936.

Soy Beans Soaked in Dilute Acid Solution at Temperature of Not More Than 75 Deg. C. for About 2 Hr. to Remove Objectionable Taste Qualities—Martin Cohn, Berlin-Freidenau, Germany, to M. Neufeld & Co., Berlin, Germany. No. 2,052,215, Aug. 25, 1936.

Dry Vitamin Concentrates Prepared From Milk and Milk Products—Carl Dickens, Oakland, Calif. No. 2,052,218. Aug. 25, 1936.

Liquid Concentrate of Water-Soluble Vitamins Prepared From Asparagus—Carl Dickens, Oakland, Calif. No. 2,052,219. Aug. 25, 1936.

Fresh Meats Subjected to 18 to 25 Deg. F. For 48 Hr. Preliminary to Thawing at 30 to 32 Deg. F. for 12 Hr. Before Slicing in Very Thin Slices—Wm. J. Dubil, Los Angeles, Calif. One-half to Edward J. Hubik, South Gate, Calif. No. 2,052,221. Aug. 25, 1936.

Oysters Shucked by Mechanical Means—Julius Kanzler, Trenton, N. J. No. 2,052,231. Aug. 25, 1936.

Lard Stabilized By Addition of Crude Soya Oil—Donald P. Grettie, Chicago, Ill. No 2,052,289. Aug. 25, 1936.

Starch Treated with an Oxidizing Agent Dried and Adjusted to pH 4 to 4.4 to Prevent Rancidity—Ralph W. Kerr, Riverside, Ill., to International Patent Development Co., Wilmington, Del. No. 2,052,308. Aug. 25, 1936.

Thick-Boiling Starch Bleached by Treatment With 0.06 to 0.1 Per Cent Permanganate and Subsequently With 0.08 to 0.14 Per Cent Sulphur Dioxide—Otto A. Sjostrom, Chicago, Ill., to International Patent Development Co., Wilmington, Del. No. 2,052,320. Aug. 25, 1936.

Aerated Honey Product Made by Inclusion of Small Amounts of Albumen and Pectin—Albert A. Lund, Port Washington, N. Y. No. 2,052,398. Aug. 25, 1936.

Oil Obtained From Rinds of Whole Citrous Fruit by Centrifugal Force of Revolving Perforated Drum Having an Inner Wall Covered With Sharp Pointed Prongs Just Long Enough to Pierce Oil Cells in Rinds—Frank C. Dorment, St Petersburg, Fla., one-half to Frank B. Edmundson, Pittsburgh Pa. No. 2,052,548. Sept. 1, 1936.

Frozen Molded Confections Separated Into Individual Portions Before Complete Solidification—Edwin W. Kronbach, Cleveland, Ohio, to Joe Lowe Corp., New York, N. Y. No. 2,052,574. Sept. 1, 1936.

Food Sterilized by Forcing Under Pressure Counter Current to Travel of Sterilizing Fluid Which Increases in Temperature as the Food Moves Towards Discharge End of Unit—Oswald H. Hansen, (deceased). Wm. H. Lieber and John A. Thiel, (executors), to Hansen Canning Machinery Corp., Cedarburg, Wis. No. 2,052,709. Sept. 1, 1936.

Beverages in Kegs Charged With Gas Under Controlled Condition—John D. Strutzel, Maywood, Ill. No. 2,052,810. Sept. 1, 1936.

Coffee Compressed Into Tablet Form—Jorge M. Placentini, to Noel & Cia Ltda., Buenos Aires, Argentina. No. 2,053,106. Sept. 1, 1936.

Fresh Pineapple Cut Into Longitudinal Pieces and Flat Slices, Then Packed Under Hermetical Seal so That Longitudinal Portions Hold the Flat Slices in Definite Geometrical Form—Helen Hughes Dulany, Chicago, Ill., to Hawaiian Pineapple Co., Honolulu, Hawaii. No. 2,053,238. Sept. 1, 1936.

Brewery Yeast Converted into Bakery Yeast—Viktor Bermann, Olmutz, Czechoslovakia, to Butacon Aktiengesellschaft, Bern Switzerland. No. 2,053,596. Sept. 8, 1936.

Pretzels Twisted by Mechanical Means—Harry A. Gerland, Baltimore, Md. No. 2,053,608. Sept. 8, 1936.